FACT SHEET FOR NPDES GENERAL PERMIT
WATER TREATMENT PLANTS - WASTEWATER DISCHARGE

SUMMARY

This fact sheet is a companion document to the National Pollutant Discharge Elimination System (NPDES) General Permit for Water Treatment Plants. It explains the nature of the proposed discharge, Ecology's decisions on limiting the pollutants in the wastewater, and the regulatory and technical basis for those decisions. Public involvement information is contained in Appendix A. Definitions are included in Appendix B.

The State of Washington Department of Ecology (Ecology) has tentatively determined to issue a general permit to the water treatment plant industry operating in the State of Washington (State) for the discharge of wastewater resulting from the production of potable water. Water treatment plants that provide primary treatment and produce "industrial water" will also be included if water treatment is the primary function of the facility. The proposed general permit has been developed to provide coverage for wastewater discharge from water treatment plants (WTPs) that discharge filter backwash and sedimentation basin waste to surface waters of the State. The proposed general permit will not provide coverage for wastewater resulting from ion exchange or reverse osmosis, nor for WTPs with a maximum production capacity of less than 50,000 gallons a day.

The general permit will propose technology-based limits for pH, settleable solids, and chlorine but will defer water quality-based considerations until the next permit cycle. The intention is to assure that all facilities are, at a minimum, providing technology-based treatment and to gather the necessary data for water quality-based determinations. A compliance schedule will be provided for existing facilities that must design and construct treatment systems necessary to achieve compliance with the technology-based limits. The proposed terms, limitations and conditions contained herein are tentative and may be changed as a result of comments and public hearings.

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INTRODUCTION

The Federal Clean Water Act (FCWA, 1972, and later modifications, 1977, 1981, and 1987) established water quality goals for the navigable (surface) waters of the United States. One of the mechanisms for achieving the goals of the Clean Water Act is the National Pollutant Discharge Elimination System of permits (NPDES permits), which is administered by the Environmental Protection Agency (EPA). The EPA has delegated responsibility to administer the NPDES permit program to the State on the basis of Chapter 90.48 RCW which defines Ecology's authority and obligations in administering the wastewater discharge permit program.

The regulations adopted by the State include procedures for issuing general permits (Chapter 173-226 WAC), water quality criteria for surface and ground waters (Chapters 173-201A and 200 WAC), and sediment management standards (Chapter 173-204 WAC). These regulations require that a permit be issued before discharge of wastewater to waters of the State is allowed. The regulations also establish the basis for effluent limitations and other requirements which are to be included in the permit. One of the requirements (WAC 173-226-110) for issuing a general permit under the NPDES permit program is the preparation of a draft permit and an accompanying fact sheet. Public notice of the availability of the draft permit is required at least thirty days before the permit is issued (WAC 173-226-130). The fact sheet and draft permit are available for review (see Appendix A--Public Involvement of this fact sheet for more detail on the Public Notice procedures).

After the public comment period has closed, Ecology will summarize the substantive comments and the response to each comment. The summary and response to comments will become part of the file on the permit and parties submitting comments will receive a copy of the Ecology's response. The fact sheet will not be revised. Comments and the resultant changes to the permit will be summarized in Appendix G--Response to Comments.

Discharge Permit Required

The discharge of wastewater from water treatment plants (WTPs) to surface water requires a permit. No pollutants may be discharged from any commercial or industrial operation into waters of the state except as authorized under a wastewater discharge permit. WTPs meet the legal definition of commercial or industrial operation, the process wastewater contains pollutants, and WTPs are a point source discharge. The proposed general permit is intended to satisfy the legal requirement for an NPDES permit for WTPs that employ filtration processes and discharge wastewater to surface water. Filtration processes include oxidative filters (birm, green sand) as well as conventional, direct, and in-line filtration systems. In addition to facilities that produce potable water, this general permit is intended to be applicable to WTPs that only apply primary treatment (settled water) producing “industrial” water, when the production and distribution of the treated water is the primary product of the industry with no other activities that would require a discharge permit. The proposed general permit will authorize the discharge of wastewater from WTPs existing prior to the issuance date of the permit. Those WTPs constructed after the issuance date of the proposed general permit may also obtain authorization to discharge under this general permit provided they have received all applicable State and local permits, including compliance with the State Environmental Policy Act (SEPA).

The establishment of a general permit for the water treatment plant industry is appropriate because of:

1) the similar wastewater characteristics among facilities,
2) the uniform discharge conditions to which all facilities would be subject, and
3) the significant reduction of resources necessary for permit handling.

However, individual permits will still be applied to those WTPs which require more detailed guidance, or when an individual WTP so desires and Ecology approves.

The WTP general permit will provide coverage for facilities with a maximum production capacity of at least 50,000 gallons per day of drinking water . Maximum production capacity refers to the amount of potable water that a treatment facility is designed to produce at peak output and 24-hour production.

Not Included In General Permit

Facilities that require a wastewater discharge permit for processes that are not associated with the production of drinking water or industrial water will not be covered under the proposed general permit. WTPs with a maximum production capacity of less than 50,000 gallons per day will not be covered under the proposed general permit. The general permit will establish monitoring and reporting requirements that assume a level of operation and expertise that is not expected from small systems. These very small WTPs have low volume and infrequent discharges that most often can be better addressed with best management practices and guidelines for environmental protection.

The proposed general permit will not cover WTP discharges that are significantly different from typical WTP filter backwash. A general permit is an appropriate vehicle for regulating wastewater discharges when the characteristics of the wastewater are similar and a single set of permit conditions can address the environmental concerns and set treatment and discharge standards for the industry as a whole. WTPs that employ treatment processes (e.g. ion exchange and reverse omosis) where the general permit conditions do not adequately address the environmental concerns associated with the wastewater discharge, will not be covered by the proposed general permit.

Ion Exchange (IX) is a type of water treatment process used by some relatively small WTPs and single domestic water systems in this State. As the name implies, ions are removed from the water as they pass over a media and then when the ability of the media to attract these ions has been consumed, the media is washed with a liquid (typically salt brine) that replaces the attached ions thereby regenerating the media. The wastewater consists of regeneration liquid, the removed ions, and rinse water. Whereas filtration processes are removing suspended solids and cleaning the filter with water, ion exchange is removing dissolved solids and adding a regeneration liquid to the wastestream. Hence the characteristics of the resulting wastewater are quite different. The proposed general permit will not apply coverage to WTPs that discharge wastewater from ion exchange processes but guidance on the permitting and best management practices required for the discharge of wastewater from these processes are included in Appendix E.

Reverse Osmosis (RO) is another water treatment process used by a few, very small water treatment systems in this State. Pressure and semipermeable membranes are used to remove

contaminants from water. The primary application of this technology in the State has been to produce potable water from salt water or brackish water. The quantity of wastewater can be greater than that of potable water produced and the resulting wastewater is very high in dissolved salts, quite different from the wastewater associated with filtration processes. The proposed general permit will not apply coverage to WTPs that discharge wastewater from reverse osmosis processes but guidance on the permitting and best management practices required for the discharge of wastewater from these processes are included in Appendix E.

Additionally, discharges to land and to sewage treatment plants (POTWs, publicly owned treatment works) by WTPs will not be covered under the proposed general permit. Ecology has determined that WTP discharges to land do not typically require a permit because the pollutants are filtered by the land and hence are not discharged to waters of the State. Discharges to land are those discharges that are designed to be completely contained by land with no reasonable potential, during all weather conditions, of discharging to surface water (see Appendix F). It has also been determined that typical WTP discharge does not have a reasonable potential to adversely affect a POTW's operation or introduce pollutants that will interfere with or pass through the POTW, nor will it violate any pretreatment standard or requirement. Additionally, the discharge has about the same concentration of suspended solids as domestic wastewater, with lower BOD and fewer pollutants than domestic wastewater, and therefore, a state-based discharge permit will not be required for typical WTP discharges to POTW (see Appendix F).

BACKGROUND INFORMATION

DESCRIPTION OF THE INDUSTRY

INDUSTRY SKETCH

Washington State Department of Health (Health) provided data on WTPs in the State that treat water with processes that are likely to result in the discharge of wastewater. There are 541 systems in this list of WTPs and 512 employ filtration. Those facilities with more than 100 residential connections were interviewed by telephone for further information about their system. The table below is based on the results of that survey and provides average production of drinking water and associated wastewater for WTPs grouped by the number of residential connections. WTPs with 100 or fewer residential connections were not interviewed but drinking water production and wastewater were estimated based on production and discharge quantities of WTPs in the 100 to 500 connection group. These very small systems are most likely discharging to land, with only a few connected to a POTW or discharging to surface water. Most of these WTPs use ground water as their source water with only 57 using surface water.

Residential Connections	# Facilities	GPD - Average	Wastewater*	Discharge to Surface	Discharge to Land	Discharge to POTW
>5,000	13	14,000,000	390,000	4	5	4
1,000 - 5,000**	21	800,000	40,000	12	3	4
500 - 1,000	15	350,000	15,000	7	7	1
100 - 500	18	100,000	6,000	12	5	1
51 - 100	15	40,000***	2,800***	?	?	?
1 - 50	340	14,000***	900***	?	?	?

* Average gallons per day or per backflush when backflush frequency is less than daily

** Two facilities have "zero" discharge
*** Estimated values, no interviews conducted

INDUSTRIAL PROCESS

Typical WTP filtration processes include presedimentation, oxidation, coagulation, flocculation, sedimentation and filtration. Although any one WTP may not utilize all the processes, the wastestream produced by any combination of processes is relatively similar. When the raw water or source water has significant levels of suspended solids such as sand, an initial settling tank may be employed to remove these solids. The settling tank can be designed to allow for continuous removal of the solids or periodically the tank may be drained and the solids removed. These solids may be disposed of separately as a solid waste or may be washed into the same wastestream as the backwash. A sedimentation basin may also be incorporated to settle solids after the addition of coagulants and flocculants but before filtration. Like a presedimentation basin, the sedimentation basin may be equipped for continuous cleaning or may be cleaned periodically and the solids may be disposed of separately or washed into the same wastestream as the backwash.

Coagulants are added to the raw water to destabilize the colloidal state of suspended particles through "charge neutralization" allowing the particles to adhere to each other. The most common coagulant in use is aluminum sulfate (alum), $Al_2(SO_4)_3 \bullet 14\ H_2O$, but at least one facility uses ferric chloride, $FeCl_3$, and there are many other coagulants available. Other additives may include compounds to adjust pH (e.g. soda ash), oxidants (e.g. chlorine, potassium permanganate, and ozone) for disinfection or precipitation of dissolved minerals, and polymers to enhance coagulation, flocculation and filtration.

A wide variety of polymers are available for use in the production of drinking water to enhance coagulation, settling (flocculation), and filtering. Polymers are large compounds that are not readily soluble and may be cationic, anionic, or nonionic. They are very susceptible to ultraviolet radiation and to microbes, thus they break down readily. Coagulant aids are the cationic polymers and are expensive and generally used in dilute amounts, in the range of 0.2 to 2 mg/L (ppm). Settling aids are anionic polymers and are used to make a heavy floc that will readily settle. These very large molecules entrap suspended particles that then settle with the polymer. The dose rates are generally in the range of 1 to 5 mg/L (ppm). Nonionic polymers are primarily used as filter aids. Filter aids are large very "sticky" polymers which interact with the filter to increase the ability of the filter medium to remove suspended particles. They easily plug a filter and hence are used in very dilute amounts, 10 to 50 µg/L (ppb).

Additives are generally applied with great care and in precise amounts. Dosage is based on the amount of suspended solids to be removed or the dissolved solids to be precipitated. This not only makes economic sense but many of these chemicals work best at just the right dosage. Too much can produce as poor a result as too little. The product here is also drinking water and the quality of that product cannot be compromised by additives. Drinking water with a "pink tinge" from the addition of too much potassium permanganate, for example, would not be acceptable.

Source water (raw water) may be either surface water or ground water and the typical processes associated with water treatment varies with the source of the water. Typical surface water treatment applies filtration to remove organic and inorganic matter and to remove pathogenic organisms. Coagulation and flocculation are key to treating surface water. Typical ground water

treatment precipitates dissolved minerals followed by filtration to remove the minerals and hence oxidation processes are key to treating ground water. Both treatment strategies apply filtration and filters loose their effectiveness as the filtrate accumulates and must be cleaned to avoid breakthrough and unacceptable headloss. Filter cleaning is accomplished by reversing the flow of water and backflushing the filter, producing wastewater composed of the filtrate and backflush water. The filtrate includes substances removed from the raw water as well as additives applied to enhance their removal and the backflush water may include additives such as chlorine. This wastewater is known as backwash and constitutes the majority of the wastewater discharge.

The frequency of discharge is highly variable, from several times a day for large WTPs with several filters to once or twice a week for small WTPs. Likewise, the quantity of the discharge varies somewhat by the size of WTP from about 3,000 gallons to backflush a small filter to 80,000 gallons for large filters. The duration of backwash discharge, however, is relatively constant, about 10 to 15 minutes per episode. Following a backflush of the filter, WTPs may also discharge the filtered water for a period of time while the filter settles and "cures", a procedure known as filter-to-waste.

DISCHARGE OUTFALL

35 facilities that discharge to surface water were interviewed. None of these facilities have a submerged discharge but instead utilize a sidebank discharge. Two discharge to a ditch that connects to a surface water body and two discharge to a stormwater conveyance that discharges to surface water.

WASTEWATER CHARACTERIZATION

WTPs may use either ground water or surface water as their source water and processes can vary depending on the treatment the source water requires. Ground water is most frequently treated to remove dissolved iron and manganese and typically includes oxidation (e.g. ozonation, addition of chlorine or potassium permanganate) to precipitate the iron and manganese followed by filtration to remove the iron and manganese oxides. The typical backwash from these oxidation/filtration processes can be characterized as follows:

Total Iron:	100 to 200 mg/L
Total Manganese:	70 to 100 mg/L
Total Residual Chlorine (TRC):	0.6 to 1 mg/L

Surface water is most frequently treated by filtration to remove suspended solids and may incorporate presedimentation and sedimentation basins before filtration. Precipitation, coagulation and flocculation are frequently used to increase the effectiveness of filtration and sedimentation. Aluminum sulfate (alum) is the most common additive and is used by WTPs for coagulation. Polymers are another common additive that may be used to enhance coagulation, flocculation, or filtration. Chlorine may be added before filtration as an oxidizing agent for precipitation and to remove unwanted taste and color and is frequently added after filtration for disinfection purposes producing the "finish water" for distribution as drinking water. This chlorinated finish water is typically used to backflush the filters. Filter backwash from standard coagulation/flocculation processes associated with treating surface water can be characterized as follows:

Settleable Solids:	6 to 20 ml/L
Aluminum Hydroxide or Ferric Hydroxide (additive) - 25 to 50%	

Clay/Silt (source water) - 35 to 50%
Organic Matter (source water) - 15 to 25%
Total Residual Chlorine, TRC (additive): 0.1 to 1 mg/L

SEPA COMPLIANCE

Existing discharges from WTPs are categorically exempt from SEPA review (WAC 197-11-855) but any new facilities must demonstrate compliance with SEPA as part of project authorization and approval in order to be eligible for coverage under the proposed general permit.

PROPOSED PERMIT LIMITATIONS

Federal and State regulations require that effluent limitations set forth in an NPDES permit must be either technology- or water quality-based. Technology-based limitations are based upon the treatment methods available to treat specific pollutants. Technology-based limitations are set by regulation or developed on a case-by-case basis (40 CFR 125.3, and Chapter 173-220 WAC). Water quality-based limitations are based upon compliance with the Surface Water Quality Standards (Chapter 173-201A WAC), Ground Water Standards (Chapter 173-200 WAC), Sediment Quality Standards (Chapter 173-204 WAC) or the National Toxics Rule (Federal Register, Volume 57, No. 246, Tuesday, December 22, 1992). The more stringent of these two limits must typically be chosen for each of the parameters of concern, however, the proposed general permit will postpone analysis of water quality-based effluent limits until permit reissuance.

TECHNOLOGY-BASED EFFLUENT LIMITATIONS

USEPA commissioned Science Applications International Corporation (SAIC) to draft a model permit for the water supply industry. Although the draft has not been implemented, SAIC released their findings in a document entitled *Model Permit Package - Water Supply Industry*, January 30, 1987. In this document SAIC conducted BPT and BCT analyses which addressed "conventional" pollutants. BAT requirements, which address "toxic" pollutants, were not developed since WTP process effluent is characterized as principally containing conventional pollutants, with insufficient evidence of toxic pollutants for development of across-the-board limits. SAIC proposed the following limits based on their "Best Professional Judgment" after considering existing permits and WTP monitoring data and achievable WTP wastewater treatment levels:

Monthly Average TSS:	30 mg/l
Daily Maximum TSS:	45 mg/l
Allowable pH range:	6.0-9.0

In 1975, the Washington State Department of Ecology proposed effluent guidelines to be used in issuing NPDES permits for municipal WTP process wastewater discharges. These guidelines set the allowable pH range at 6.0 to 9.0 standard units and a settleable solids[1] (SS) limit of 0.1 ml/L. This guidance was reaffirmed by Ecology in 1985 and justified under the AKART requirements of RCW 90.52.040.

[1] Ecology has determined that SS is a simpler and less costly test than TSS and may provide a more accurate measure of sedimentation treatment process efficiency. Further, an SS measurement of 0.1 ml/L is comparable to a 30 mg/L TSS measurement (letter from Stan Springer, Ecology, to Michael Lorenzo, SAIC, March 12, 1987).

State legislation passed in 1987 provided a credit adjustment of technology-based effluent limitations or standards for WTP facilities on the Chehalis, Columbia, Cowlitz, Lewis, and Skagit rivers that meet the criteria of RCW 90.54.020(3)(b). The adjustment would set limits that would effectively allow the residual solids to be returned to the river without removal treatment as long as water quality standards were not violated. Applying the federal requirements for BPT and BCT determinations, however, results in limits for residual solids that would not be achievable without removal treatment (see Appendix D). A settleable solids limit based on a credit adjustment would, therefore, be in conflict with a settleable solids limit based on BPT/BCT, setting up a legal conflict that makes issuance of an NPDES permit moot. Further, credit adjustment is only applicable to a few facilities that meet the requirements of RCW 90.54.020(3)(b) and a general permit is not the appropriate vehicle to accommodate the resulting site-specific complexity. Therefore the proposed general permit will not include any provisions for credit adjustment of technology-based effluent limits for facilities that meet the criteria of RCW 90.54.020(3)(b). Those facilities may accept the terms and conditions of the proposed general permit and apply for coverage but any facility wishing to claim a credit adjustment must request an individual permit and will not be eligible for coverage under the proposed general permit.

In Washington State, 15 WTPs that discharge to surface water have had wastewater discharge permits issued. Twelve (12) of these treat the wastewater by settling prior to discharge. Those WTPs that settle out solids have generally been able to achieve compliance with the settleable solids limit of 0.1 ml/L as contained in Ecology's guidelines. However, there is some concern that from time to time the raw water will be so high in suspended solids that the volume of backwash discharge will exceed the design capacity of settling treatment, resulting in an exceedance of 0.1 ml/L. There is also concern that increasing design capacity to provide adequate treatment under such conditions would dramatically increase costs. No data are currently available for State facilities to evaluate these concerns and therefore no alternative limits for conditions of severe turbidity will be proposed at this time.

Normal WTP operation will result in wastewater discharge pH in the range of 6.0 to 9.0. WTPs may adjust the pH of incoming water (raw water) to achieve optimal conditions for facility processes. For instance, a pH of 6.5 to 6.8 is usually considered "optimum" for alum coagulation. After filtration, facilities may also adjust pH to 7.5-8.5 for corrosion control in the distribution system. This adjusted pH water would typically be used to backflush the filter. Where available, pH data for WTP wastewater discharges in the State indicate pH has been consistently within the range of 6.0 to 8.5 standard units.

Lagoon/settling tank treatment is a relatively inexpensive form of treatment[2] and is effective in significantly reducing the amount of solids that are discharged and provides some reduction in the amount of total residual chlorine (TRC). Lagoon treatment requires about one acre of land per each million gallons/day of production. Design and construction requirements are readily available with no special requirements other than the availability of land. Treatment provides over 90% removal of the solids, reducing the amount of settleable solids from a range of 6 to 20 ml/L to less than 0.1 ml/L. TRC is reduced from as much as 1 mg/L to 0.3 mg/L or less. Cost

[2] Based on a twenty (20) year cost averaging, $100/dry ton or 5 cents a pound, was the estimated cost for one large facility to acquire land, design and build the lagoon, and pay operation and maintenance and disposal costs. A medium sized facility, 18,000 customers, estimated that their costs for design, build, and operate resulted in a 0.7% to 1% rate increase (based on 20-year cost recovery).

can be a formidable barrier, however, where there is no room for expansion or when land acquisition would be extremely expensive.

Based on the federal study and existing facilities in this State, and "best professional judgment," Ecology proposes technology-based limits for WTPs be set as follows:

settleable solids	0.1 ml/L monthly average
	0.2 ml/L daily maximum
pH range	6.0 to 9.0 standard units
TRC	0.3 mg/L monthly average
	0.5 mg/L daily maximum

There are existing facilities that have not implemented any form of effluent treatment and would not be able to achieve the above technology-based effluent limits. Other existing facilities have some form of effluent treatment but have not conducted testing to determine the effectiveness of the treatment. The general permit will therefore provide a compliance schedule for these facilities to develop the capability of achieving these limits. A period of up to three (3) years will be allotted to implement effluent treatment and/or process changes and during this time technology-based effluent limits for settleable solids and total residual chlorine will be suspended and only monitoring will be required. By the end the first year, each facility will be expected to provide an engineering report to Ecology that will set forth how the facility will achieve compliance with the permit limits. If a facility determines that they can achieve compliance with existing processes and treatment, the facility must so notify Ecology, the compliance schedule will terminate, and the technology-based limits will become effective immediately. During the second year of the compliance schedule, facilities will finalize planning and secure any necessary funding for implementation. Implementation will be completed by the end of the third year and the technology-based limits will become effective at that time. New facilities will be expected to meet the technology-based limits as soon as they become operational.

SURFACE WATER QUALITY-BASED EFFLUENT LIMITATIONS

In order to protect existing water quality and preserve the designated beneficial uses of Washington's surface waters, WAC 173-201A-060 stipulates that waste discharge permits shall be conditioned such that the discharge will meet established Surface Water Quality Standards. The Washington State Surface Water Quality Standards (Chapter 173-201A WAC) is a state regulation designed to protect the beneficial uses of the surface waters of the state. However, there are not sufficient data at this time to make relevant reasonable potential determinations for water quality-based limits for the WTP industry as a whole. Additionally, not all facilities have achieved technology-based treatment and this must be achieved before the data will reflect values that are representative of base level treatment. The proposed general permit will therefore not set water quality-based permit limits but will establish monitoring requirements so that there will be sufficient data to make these water quality-based determinations when the general permit is reissued.

Permittees are advised, however, to consider water quality criteria and any facility upgrade should be considered an opportunity to implement changes that improve effluent water quality. Particular attention should be paid to total residual chlorine levels, turbidity, pH, dissolved oxygen and temperature. Although a mixing zone may be allowed, the discharge of an effluent should have no significant impact on these parameters in the receiving water.

NUMERICAL CRITERIA FOR THE PROTECTION OF AQUATIC LIFE

"Numerical" water quality criteria are numerical values set forth in the State's Water Quality Standards for Surface Waters (Chapter 173-201A WAC). They specify the levels of pollutants allowed in a receiving water while remaining protective of aquatic life. Numerical criteria set forth in the Water Quality Standards are used along with chemical and physical data for the wastewater and receiving water to derive the effluent limits in the discharge permit. When surface water quality-based limits are more stringent or potentially more stringent than technology-based limitations, they must be used in a permit.

NUMERICAL CRITERIA FOR THE PROTECTION OF HUMAN HEALTH

The US EPA has promulgated 91 numeric water quality criteria for the protection of human health that are applicable to Washington State (EPA 1992). These criteria are designed to protect humans from cancer and other disease and are primarily applicable to fish and shellfish consumption and drinking water from surface waters.

NARRATIVE CRITERIA

In addition to numerical criteria, "narrative" water quality criteria (WAC 173-201A-030) limit toxic, radioactive, or deleterious material concentrations below those which have the potential to adversely affect characteristic water uses, cause acute or chronic toxicity to biota, impair aesthetic values, or adversely affect human health. Narrative criteria protect the specific beneficial uses of all fresh (WAC 173-201A-130) and marine (WAC 173-201A-140) waters in the State.

ANTIDEGRADATION

The State's Antidegradation Policy requires that discharges into a receiving water shall not further degrade the existing water quality of the water body. In cases where the natural conditions of a receiving water are of lower quality than the criteria assigned, the natural conditions shall constitute the water quality criteria. Similarly, when the natural conditions of a receiving water are of higher quality than the criteria assigned, the natural conditions shall constitute the water quality criteria. More information on the State Antidegradation Policy can be obtained by referring to WAC 173-201A-070.

CRITICAL CONDITIONS

Surface water quality-based limits are derived for the waterbody's critical condition, which represents the receiving water and waste discharge condition with the highest potential for adverse impact on the aquatic biota, human health, and existing or characteristic water body uses. While a general permit is not an appropriate vehicle to accommodate complex site-specific characterization of critical conditions, consideration of some conditions such as the low flow rate of rivers (7Q10) and mean detention time and volume of a lakes, may be considered when evaluating water quality-based criteria. Permit reissuance may establish a mixing zone that requires data characterizing critical conditions for each WTP covered by the general permit. Ecology recommends that permittees covered under this permit obtain data to characterize critical conditions of the receiving water during the term of this permit.

MIXING ZONES

The Water Quality Standards allow the Ecology to authorize mixing zones around a point of discharge in establishing surface water quality-based effluent limits. Both "acute" and "chronic" mixing zones may be authorized for pollutants that can have a toxic effect on the aquatic environment near the point of discharge. The concentration of pollutants at the boundary of these mixing zones may not exceed the numerical criteria for that type of zone. Mixing zones can only be authorized for discharges that are receiving all known, available, and reasonable methods of prevention, control and treatment (AKART) and in accordance with other mixing zone requirements of WAC 173-201A-100.

The National Toxics Rule (EPA, 1992) allows the chronic mixing zone to be used to meet human health criteria. Since no water quality-based limits have been set in this permit, no mixing zones will be established at this time. During the next permit cycle, the monitoring data will be evaluated and water quality-based limits may result. Discharge flow data and typical receiving water characteristics will also be evaluated and establishment of a mixing zone will be considered.

DESCRIPTION OF RECEIVING WATER

Typical facilities discharge to rivers which are designated as either Class AA or A. Two facilities discharge to lakes and there are no known facilities that discharge directly to marine waters or estuaries. Characteristic uses include the following:

> water supply (domestic, industrial, agricultural); stock watering; fish migration; fish rearing, spawning and harvesting; wildlife habitat; primary contact recreation; sport fishing; boating and aesthetic enjoyment; commerce and navigation. Water quality of this class shall markedly and uniformly exceed the requirements for all or substantially all uses.

SURFACE WATER QUALITY CRITERIA

Toxic Pollutants--Federal regulations (40 CFR 122.44) require NPDES permits to contain effluent limits for toxic chemicals in an effluent whenever there is a reasonable potential for those chemicals to exceed the surface water quality criteria. This process occurs concurrently with the derivation of technology-based effluent limits. Facilities with technology-based effluent limits defined in regulation are not exempted from meeting the Water Quality Standards for Surface Waters or from having surface water quality-based effluent limits.

Toxics in toxic amounts should not be found in additives used by the WTP industry with the exception of chlorine. ANSI/NSF Standard 60 defines requirements for the control of potentially adverse human health effects from products added to drinking water for treatment. Only certified chemicals that meet Standard 60 requirements are acceptable for use in the treatment of drinking water. Certification assures that water treatment chemicals will not exceed a maximum allowable limit which, in general, is set at 1/10th of the maximum contamination level (MCL) set by USEPA for drinking water and 1/10th of the maximum drinking water levels (based on toxicological criteria) for unregulated contaminants. Likewise, source water is not likely to have toxics in toxic amounts because that would make it very unattractive as a source for drinking water. Therefore, it is reasonable to assume that wastewater discharge from filtration processing

in the production of potable water will not contain toxics in toxic amounts with the possible exception of chlorine.

WHOLE EFFLUENT TOXICITY

The Water Quality Standards for Surface Waters require that the effluent not cause toxic effects in the receiving waters. Many toxic pollutants cannot be detected by commonly available detection methods. However, toxicity can be measured directly by exposing living organisms to the wastewater in laboratory tests and measuring the response of the organisms. Toxicity tests measure the aggregate toxicity of the whole effluent, and therefore this approach is called whole effluent toxicity (WET) testing.

Toxicity caused by unidentified pollutants is not expected in the effluent from this discharge as determined by the screening criteria given in Chapter 173-205 WAC. Therefore, no WET testing is required by the proposed general permit. Ecology may require effluent toxicity testing in the future if it receives information that toxicity may be present in this effluent.

HUMAN HEALTH

The State's water quality standards now include 91 numeric health-based criteria that must be considered in NPDES permits. These criteria were promulgated for the State by the EPA in its National Toxics Rule (Federal Register, Volume 57, No. 246, Tuesday, December 22, 1992).

Chlorine is frequently added during the production of potable water and is typically found in the water used to backflush filters. It can combine with organic material in water and produce byproducts, trihalomethanes, which are regulated under the State's water quality standards (Human Health Criteria) as well as by the Washington State Department of Health (Drinking Water Standards). The State's drinking water standards have set a maximum contamination level (MCL) for total trihalomethanes in the finished product (potable water). The National Toxics Rule listed criteria for trihalomethane compounds; chloroform (trichloromethane), chlorodibromomethane, and dichlorobromomethane; based on determinations of their human cancer-causing potential. Drinking water standards are likely to be sufficiently protective because the WTP process wastewater should contain these chlorine-related substances at substantially the same or slightly higher concentration level as that found in the potable water and those concentrations are not likely to exceed health-based criteria. The general permit will, therefore, not include any human health-based limits but will require some testing during this permit cycle and the data will be evaluated during permit renewal.

SEDIMENT QUALITY

Ecology has promulgated aquatic sediment standards (Chapter 173-204 WAC) to protect aquatic biota and human health. These standards state that Ecology may require Permittees to evaluate the potential for the discharge to cause a violation of applicable standards (WAC 173-204-400).

Ecology has determined through a review of the discharger characteristics and effluent characteristics that this discharge has no reasonable potential to violate the Sediment Management Standards.

GROUND WATER QUALITY LIMITATIONS

Ecology has promulgated Ground Water Quality Standards (Chapter 173-200 WAC) to protect beneficial uses of ground water. Permits issued by Ecology shall be conditioned in such a manner so as not to allow violations of those standards (WAC 173-200-100). Typical WTP processing and disposal of wastewater will not result in pollutants contaminating ground water and therefore no ground water quality limits will be considered for the proposed general permit.

MONITORING REQUIREMENTS

Monitoring, recording, and reporting are required (WAC 173-220-210 and 40 CFR 122.41) to verify that the treatment process is functioning correctly and the effluent limitations are being achieved.

Monitoring for **total residual chlorine, settleable solids, pH, turbidity, dissolved oxygen, temperature, and trihalomethanes** are being required to further characterize the effluent. These pollutant(s) could have a significant impact on the quality of the surface water and these data are necessary to evaluate water quality-based criteria when the proposed general permit is renewed. Trihalomethanes will be reported as a total and by the individual components; trichloromethane (chloroform), dichlorobromomethane, and chlorodibromomethane. Evaluation of these data during permit renewal will determine if there is reasonable potential to exceed water quality-based criteria and whether continued monitoring and limits are appropriate for any of these parameters. Monitoring for these parameters will be limited to a two-year period at the end of the permit cycle. Two years of data are sufficient for effluent characterization.

The monitoring schedule is detailed in the proposed general permit under Condition S4. Specified monitoring frequencies take into account the quantity and variability of the discharge, the treatment method, significance of pollutants, and cost of monitoring. The quantity of wastewater discharge for small facilities is significantly less than for large facilities but the cost of monitoring for the small facility in terms of cost per residential connection is much greater than for larger facilities. Typical characteristics and treatment of ground water result in less variability in the wastewater discharge than for surface water. Therefore, the monitoring schedule will be divided into two tiers based on the capacity of a facility to produce finished water (facility size) and the source of raw water (ground water versus surface water). Group 1 facilities will be those that have a maximum production capacity of less than 4 million gallons a day or only use ground water for their source water. Those facilities with a maximum production capacity of 4 million gallons a day, or more, and are treating surface water will be Group 2 facilities.

Sampling must be representative of the effluent. The effluent from direct discharge of filter backwash is not homogenous and a composite sample must be taken to be representative of settleable solids, turbidity, and trihalomethanes. Manual compositing will be acceptable as long as it is conducted to be representative of the total discharge event.

LAB ACCREDITATION

With the exception of certain parameters the proposed general permit requires all monitoring data to be prepared by a laboratory registered or accredited under the provisions of Chapter 173-50 WAC, *Accreditation of Environmental Laboratories.* Ecology and Health have a memorandum

of understanding relating to the respective roles and responsibilities of the two agencies to coordinate activities concerning accreditation or certification of laboratories testing water samples. Labs accredited by Health (and not by Ecology) must have third-party approval as provided by WAC 173-50-170 to meet lab accreditation permit requirements.

OTHER PERMIT CONDITIONS

REPORTING AND RECORDKEEPING

The terms of Condition S6. are based on the authority to specify any appropriate reporting and recordkeeping requirements to prevent and control waste discharges (WAC 273-220-210). Monitoring reports will be submitted every month using the discharge monitoring report form provided by Ecology.

BEST MANAGEMENT PRACTICES

Ecology has determined that WTPs typically store a quantity of chemicals that have the potential to cause water pollution if accidentally released. It is also typical for water treatment plants to employ hyper-chlorination treatment for facility and delivery system sanitation. Disposal of this highly chlorinated water has the potential to cause water pollution if appropriate measures are not taken. Ecology has the authority under section 402(a)(1) of the Federal Water Pollution Control Act (FWPCA) and RCW 90.48.080 to require the Permittee to develop best management plans to prevent the accidental release of chemicals and require appropriate handling of the release of hyper-chlorinated water.

The proposed permit requires the Permittee to develop, maintain, and implement a plan for preventing the accidental release of pollutants to state waters and for minimizing damages if such a spill occurs. This plan shall be available on-site to Ecology. Disposal of hyper-chlorinated water to surface water is prohibited. The proposed general permit will require the Permittee to develop, maintain, and implement a plan for the safe release of hyper-chlorinated water either through dechlorination or through containment followed by discharge to land.

SOLID WASTE PLAN AND SOLID WASTE PERMITS

Lagoon/settling tank treatment to reduce the amount of solids in the wastewater discharge results in an accumulation of residual solids. Ecology has determined that the accumulation of residual solids from WTPs has a potential to cause pollution of the waters of the State from leachate of solid waste. While the residuals tend to be stable and insoluble, under acidic or anoxic conditions, this stability is not assured. If allowed to build up, material from this discharge may solubilize and be carried to ground water. Therefore, periodic removal and beneficial use or disposal of the residuals is necessary.

Ecology encourages the application of residual solids to a beneficial use rather than to a landfill. In most cases WTP residuals will be classified as nonhazardous solid waste but a toxicity characteristics leaching procedure (TCLP) test will likely be necessary to assure that the residuals will not qualify as hazardous under Federal and State hazardous waste regulations. Beneficial use can include incorporation in the production of a product such as concrete, direct application to

soil at an approved agronomic rate[3], or as a component of a soil mix. Any beneficial use, however, must be consistent with any local requirements for a solid waste permit and approval must be obtained from the jurisdictional health department before undertaking a beneficial use project.

This proposed general permit requires, under authority of RCW 90.48.080, that the Permittee have a solid waste plan to prevent solid waste from causing pollution of waters of the State. The plan must be submitted to the local permitting agency for approval and available on-site to Ecology.

GENERAL CONDITIONS

General Conditions are based directly on State and Federal law and regulations and are applicable to general permits issued by Ecology. "G17. Removed Substances" prohibits the addition of removed substances to the treated effluent. This does not refer to the small amount of residual solids that will remain in suspension in the treated effluent but prohibits adding any removed substances to the treated effluent at discharge even if the effluent with the added substances would be below the established limit for settleable solids.

ECONOMIC IMPACT ANALYSIS

SMALL BUSINESS ECONOMIC IMPACT

An economic impact analysis was conducted to evaluate the impact that the proposed general permit will have on small business and to reduce that impact when legal and feasible pursuant to WAC 173-226-120. The cost of implementing and operating typical technology-based treatment was evaluated based on a 20-year lifespan of operation and cost recovery. The annual cost per connection varied dramatically from about 10 cents a year for a very large facility (400,000 residential connections) to about $20.00 a year for a small facility (1,000 residential connections). Likewise, the cost per customer of monitoring was much less for a large facility than it was for a small facility. Although the increased cost of doing business for a small facility was not so large that it could not be passed on to the consumer, attempts have been made to mitigate the disparity of economic impact.

1. Facilities with a maximum production capacity of less than 50,000 gallons a day are excluded from the proposed general permit.

2. Discharges to land and to POTWs will not typically require a permit. Currently a larger percentage of small facilities discharge to land or POTW than large facilities. These discharge options are also generally more realistic and easier to implement by small facilities than by large facilities.

[3] land application of alum residuals can cause a reduction in available phosphorus, however, application rates of up to 7.34 tons/acre-year should not cause environmental degradation

3. Monitoring requirements will be reduced for some parameters, including trihalomethane (THM), for facilities with a maximum production capacity of less than 4,000,000 gallons a day.

PERMIT ISSUANCE PROCEDURES

PERMIT MODIFICATIONS

Ecology may modify the proposed general permit to impose numerical limitations, if necessary to meet Water Quality Standards for Surface Waters, Sediment Quality Standards, or Water Quality Standards for Ground Waters, based on new information obtained from sources such as inspections and effluent monitoring.

Ecology may also modify the proposed general permit as a result of new or amended State or Federal regulations.

RECOMMENDATION FOR PERMIT ISSUANCE

This proposed general permit meets all statutory requirements for authorizing a wastewater discharge, including those limitations and conditions believed necessary to control toxics, protect human health, aquatic life, and the beneficial uses of waters of the State. Ecology proposes that this general permit be issued for a 5-year term.

REFERENCES FOR TEXT AND APPENDICES

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1985. Water Quality Assessment: A Screening Procedure for Toxic and Conventional Pollutants in Surface and Ground Water. EPA/600/6-85/002a.

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1985. Water Treatment Principles and Design. John Wiley & Sons Inc.

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1972. Characterization of Stream Reaeration Capacity. EPA-R3-72-012. (Cited in EPA 1985 op.cit.)

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APPENDIX A--PUBLIC INVOLVEMENT INFORMATION

Ecology has tentatively determined to prepare a general permit for certain categories of water treatment plants. The permit contains conditions and effluent limitations which are described in the rest of this fact sheet.

Public notice of this determination was issued in the Winter 1996/1997 issue of Confluence (Washington State Department of Ecology quarterly newsletter), in the March 1997 issue of Water Tap (Washington State Department of Health drinking water newsletter), in a mailing to water treatment plants that were likely candidates for coverage under the proposed general permit, and via Ecology's home page on the Internet to inform the public that this effort is underway and to invite comment on the issuance of this permit.

Ecology will publish a Public Notice of Draft (PNOD) on October 1, 1997 in the State Register, the Vancouver Columbian, the Seattle Times, the Seattle Daily Journal of Commerce, the Tri-City Herald, the Spokesman Review, and the Bellingham Herald to inform the public that a draft permit and fact sheet are available for review. The Public Notice will also announce the public hearing on the draft permit. Interested persons are invited to submit written comments regarding the draft permit. The draft permit, fact sheet, and related documents are available for inspection and copying between the hours of 8:00 a.m. and 5:00 p.m. weekdays, by appointment, at the headquarters office listed below. These documents will also be available on Ecology's web site:

http://www.wa.gov/ecology/wq/wqpermit/

Written comments should be mailed to:

Keith Johnson, Water Quality Program
Department of Ecology
PO Box 47600
Olympia, WA 98504-7600

The public workshop and hearing on the proposed general permit will be held on Friday, November 7, 1997. The purpose of the workshop is to explain the general permit, answer questions, and facilitate meaningful testimony during the hearing. The purpose of the hearing is to provide interested parties an opportunity to give formal oral testimony and comments on the proposed general permit. The workshop and hearing will be held at this location:

Washington State Department of Ecology
Headquarters Building
300 Desmond Drive
Lacey, Washington

The public workshop will begin at 10:00 a.m. and last until 11:30 a.m. The formal public hearing will begin at 12:00 p.m.

Any interested party may comment on the draft permit or request an additional public hearing on this draft permit within the thirty (30) day comment period to the address above. The request for an additional hearing shall indicate the interest of the party and reasons why another hearing is warranted. Public notice regarding the upcoming hearing will be circulated at least thirty (30)

days in advance of the hearing. People expressing an interest in this permit will be mailed an individual notice of hearing (WAC 173-220-100).

Written comments must be postmarked by midnight, **Friday, November 14, 1997**. Ecology will consider all comments received within the allotted time, in formulating a final determination to issue, revise, or not issue the general permit. Ecology's response to all significant comments is available upon request and will be mailed directly to people expressing an interest in the proposed general permit.

Further information may be obtained from Ecology by telephone, (360) 407-6442, TDD (only) - (360) 407-6006, by E-Mail at KJOH461@ecy.wa.gov, or by writing to the address listed above.

This permit and fact sheet were written by Keith Johnson.

APPENDIX B--GLOSSARY

Acute Toxicity--The lethal effect of a compound on an organism that occurs in a short period of time, usually 48 to 96 hours.

AKART-- An acronym for "all known, available, and reasonable methods of prevention, control, and treatment".

Ambient Water Quality--The existing environmental condition of the water in a receiving water body.

Ammonia--Ammonia is produced by the breakdown of nitrogenous materials in wastewater. Ammonia is toxic to aquatic organisms, exerts an oxygen demand, and contributes to eutrophication. It also increases the amount of chlorine needed to disinfect wastewater.

Average Monthly Discharge Limitation --The average of the measured values obtained over a calendar month's time.

Best Management Practices (BMPs)--Schedules of activities, prohibitions of practices, maintenance procedures, and other physical, structural and/or managerial practices to prevent or reduce the pollution of waters of the State. BMPs include treatment systems, operating procedures, and practices to control: plant site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage. BMPs may be further categorized as operational, source control, erosion and sediment control, and treatment BMPs.

BOD_5--Determining the Biochemical Oxygen Demand of an effluent is an indirect way of measuring the quantity of organic material present in an effluent that is utilized by bacteria. The BOD_5 is used in modeling to measure the reduction of dissolved oxygen in a receiving water after effluent is discharged. Stress caused by reduced dissolved oxygen levels makes organisms less competitive and less able to sustain their species in the aquatic environment. Although BOD is not a specific compound, it is defined as a conventional pollutant under the federal Clean Water Act.

Bypass--The intentional diversion of waste streams from any portion of a treatment facility.

Chlorine--Chlorine is used to disinfect wastewater of pathogens harmful to human health. It is also extremely toxic to aquatic life.

Chronic Toxicity--The effect of a compound on an organism over a relatively long time, often 1/10 of an organism's lifespan or more. Chronic toxicity can measure survival, reproduction or growth rates, or other parameters to measure the toxic effects of a compound or combination of compounds.

Clean Water Act (CWA)--The Federal Water Pollution Control Act enacted by Public Law 92-500, as amended by Public Laws 95-217, 95-576, 96-483, 97-117; USC 1251 et seq.

Compliance Inspection - Without Sampling--A site visit for the purpose of determining the compliance of a facility with the terms and conditions of its permit or with applicable statutes and regulations.

Compliance Inspection - With Sampling--A site visit to accomplish the purpose of a Compliance Inspection - Without Sampling and as a minimum, sampling and analysis for all parameters with limits in the permit to ascertain compliance with those limits; and, for municipal facilities, sampling of influent to ascertain compliance with the 85 percent removal requirement. Additional sampling may be conducted.

Composite Sample--A mixture of grab samples collected at the same sampling point at different times, formed either by continuous sampling or by mixing discrete samples. May be "time-composite"(collected at constant time intervals) or "flow-proportional" (collected either as a constant sample volume at time intervals proportional to stream flow, or collected by increasing the volume of each aliquot as the flow increased while maintaining a constant time interval between the aliquots.

Construction Activity--Clearing, grading, excavation and any other activity which disturbs the surface of the land. Such activities may include road building, construction of residential houses, office buildings, or industrial buildings, and demolition activity.

Critical Condition--The time during which the combination of receiving water and waste discharge conditions have the highest potential for causing toxicity in the receiving water environment. This situation usually occurs when the flow within a water body is low, thus, its ability to dilute effluent is reduced.

Dilution Factor--A measure of the amount of mixing of effluent and receiving water that occurs at the boundary of the mixing zone. Expressed as the inverse of the percent effluent fraction e.g., a dilution factor of 10 means the effluent comprises 10% by volume and the receiving water 90%.

Engineering Report--A document which thoroughly examines the engineering and administrative aspects of a particular domestic or industrial wastewater facility. The report shall contain the appropriate information required in WAC 173-240-060 or 173-240-130.

Fecal Coliform Bacteria--Fecal coliform bacteria are used as indicators of pathogenic bacteria in the effluent that are harmful to humans. Pathogenic bacteria in wastewater discharges are controlled by disinfecting the wastewater. The presence of high numbers of fecal coliform bacteria in a water body can indicate the recent release of untreated wastewater and/or the presence of animal feces.

Grab Sample--A single sample or measurement taken at a specific time or over as short period of time as is feasible.

Industrial Wastewater--Water or liquid-carried waste from industrial or commercial processes, as distinct from domestic wastewater. These wastes may result from any process or activity of industry, manufacture, trade or business, from the development of any natural resource, or from animal operations such as feed lots, poultry houses, or dairies. The term includes contaminated storm water and, also, leachate from solid waste facilities.

Major Facility--A facility discharging to surface water with an EPA rating score of > 80 points based on such factors as flow volume, toxic pollutant potential, and public health impact.

Maximum Daily Discharge Limitation--The highest allowable daily discharge of a pollutant measured during a calendar day or any 24-hour period that reasonably represents the calendar day for purposes of sampling. The daily discharge is calculated as the average measurement of the pollutant over the day.

Method Detection Level (MDL)--The minimum concentration of a substance that can be measured and reported with 99% confidence that the analyte concentration is above zero and is determined from analysis of a sample in a given matrix containing the analyte.

Minor Facility--A facility discharging to surface water with an EPA rating score of < 80 points based on such factors as flow volume, toxic pollutant potential, and public health impact.

Mixing Zone--An area that surrounds an effluent discharge within which water quality criteria may be exceeded. The area of the authorized mixing zone is specified in a facility's permit and follows procedures outlined in State regulations (Chapter 173-201A WAC).

National Pollutant Discharge Elimination System (NPDES)--The NPDES (Section 402 of the Clean Water Act) is the Federal wastewater permitting system for discharges to navigable waters of the United States. Many states, including the State of Washington, have been delegated the authority to issue these permits. NPDES permits issued by Washington State permit writers are joint NPDES/State permits issued under both State and Federal laws.

pH--The pH of a liquid measures its acidity or alkalinity. A pH of 7 is defined as neutral, and large variations above or below this value are considered harmful to most aquatic life.

Quantitation Level (QL)-- A calculated value five times the MDL (method detection level).

Technology-based Effluent Limit--A permit limit that is based on the ability of a treatment method to reduce the pollutant.

Total Suspended Solids (TSS)--Total suspended solids is the particulate material in an effluent. Large quantities of TSS discharged to a receiving water may result in solids accumulation. Apart from any toxic effects attributable to substances leached out by water, suspended solids may kill fish, shellfish, and other aquatic organisms by causing abrasive injuries and by clogging the gills and respiratory passages of various aquatic fauna. Indirectly, suspended solids can screen out light and can promote and maintain the development of noxious conditions through oxygen depletion.

State Waters--Lakes, rivers, ponds, streams, inland waters, underground waters, salt waters, and all other surface waters and watercourses within the jurisdiction of the State.

Stormwater--That portion of precipitation that does not naturally percolate into the ground or evaporate, but flows via overland flow, interflow, pipes, and other features of a storm water drainage system into a defined surface water body, or a constructed infiltration facility.

Upset--An exceptional incident in which there is unintentional and temporary noncompliance with technology-based permit effluent limitations because of factors beyond the reasonable control of the Permittee. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, lack of preventative maintenance, or careless or improper operation.

Water Quality-based Effluent Limit--A limit on the concentration of an effluent parameter that is intended to prevent the concentration of that parameter from exceeding its water quality criterion after it is discharged into a receiving water.

APPENDIX C--TELEPHONE SURVEY RESULTS

Washington State Department of Health provided data on WTPs in the State that treat water with processes that are likely to result in the discharge of wastewater. There were 541 systems in this list of WTPs and 512 that employ filtration. Those facilities with more than 100 residential connections were interviewed by telephone for further information about their system. The average and maximum production of potable water and discharge of wastewater is recorded below in gallons per day (GPD):

Water Treatment Plants

With Ground Water as Source Water*

Facilities > 5,000 Connections			Facilities 1,000 - 5,000 Connections		
Average	Maximum	Discharge	Average	Maximum	Discharge
400,000	NA	4,000	140,000	200,000	4,000
600,000	NA	6,000	2,000,000	3,000,000	100,000
2,500,000	NA	25,000	900,000	1,000,000	75,000
150,000	NA	15,000	500,000	1,000,000	1,000
912,500		12,500	400,000	800,000	1,000
			788,000	1,200,000	36,200

Facilities 500 - 1,000 Connections			Facilities 100 - 500 Connections		
Average	Maximum	Discharge	Average	Maximum	Discharge
550,000	750,000	30,000	150,000	160,000	1,500
100,000	250,000	8,000	75,000	200,000	4,000
68,000	200,000	10,000	30,000	60,000	1,000
100,000	200,000	1,000	5,000	16,000	200
204,500	350,000	12,250	23,000	35,000	1,000
			34,000	87,000	1,000
			30,000	30,000	100
			5,000		300
			44,000	84,000	1,138

	Finish Water		Wastewater
Facility Size	Average	Maximum	Discharge
>5,000	912,500		12,500
1,000 - 5,000	788,000	1,200,000	36,200
500 - 1,000	204,500	350,000	12,250
100 - 500	44,000	84,000	1,100

* Primarily Iron and Manganese Removal - Precipitation/Filtration
Often there were several wells to a water system with only some of the wells requiring treatment. Gallons per day (GPD) is only for treated water.

Water Treatment Plants

With Surface Water as Source Water**

Facilities > 5,000 Connections			Facilities 1,000 - 5,000 Connections		
Average	Maximum	Discharge	Average	Maximum	Discharge
17,000,000	30,000,000	500,000	900,000	1,400,000	5,000
10,000,000	31,000,000	300,000	1,200,000	1,500,000	30,000
60,000,000	100,000,000	1,000,000	2,000,000	4,000,000	100,000
5,000,000	7,500,000	100,000	100,000	800,000	3,000
6,000,000	14,000,000	136,000	900,000	4,250,000	11,000
4,000,000	13,500,000	150,000	300,000	900,000	25,000
6,000,000	21,000,000	600,000	1,250,000	2,000,000	60,000
7,000,000	12,000,000	200,000	350,000	800,000	7,000
13,000,000	22,000,000	600,000	700,000	1,200,000	60,000
14,222,222	27,888,889	398,444	1,600,000	5,000,000	100,000
			400,000	1,300,000	45,000
			700,000	1,200,000	20,000
			800,000	1,600,000	90,000
			450,000	900,000	22,000
			350,000	450,000	30,000
			800,000	1,820,000	40,533

Facilities 500 - 1,000 Connections			Facilities 100 - 500 Connections		
Average	Maximum	Discharge	Average	Maximum	Discharge
200,000		20,000	65,000	110,000	3,000
200,000	600,000	10,000	280,000	500,000	3,300
450,000	1,200,000	50,000	140,000	275,000	7,000
600,000	2,000,000	33,000	288,000		25,000
150,000	250,000	6,000	70,000	140,000	5,000
400,000	1,000,000	30,000	90,000	140,000	8,000
1,000,000	1,500,000	10,000	170,000	200,000	12,000
400,000	800,000	14,000	70,000	90,000	7,000
670,000	750,000	20,000	146,625	207,857	8,788
200,000	500,000	18,000			
200,000	350,000	5,000			
406,364	895,000	19,636			

Facility Size	Average	Maximum	Discharge
>5,000	14,000,000	28,000,000	398,400
1,000 - 5,000	800,000	1,820,000	40,500
500 - 1,000	406,000	895,000	19,600
100 - 500	147,000	210,000	8,800

** Primarily Sediment/Pathogen Removal - Coagulation/Flocculation/Filtration

APPENDIX D - TECHNOLOGY-BASED TREATMENT

The Washington State Department of Ecology (Ecology) has concluded that:

1. using the criteria for setting case-by-case limitations pursuant to 40 CFR Part 125.3(d) results in effluent limits that require the removal of residual solids from water treatment plant (WTP) effluent; and
2. the credit adjustment allowed under RCW 90.54.020(3)(b) is in conflict with the federal requirements for applying technology-based effluent limits.

Residual Solids are Pollutants

It has been suggested that returning residual solids to the same waterbody as is the source of the solids does not constitute an addition of pollutants to navigable waters of the United States under the Federal Clean Water Act and hence technology-based treatment of these solids is not required. This line of logic is often supported by some case law involving pollutants that pass through a hydroelectric facility. In these cases the pollutants that pass through the hydroelectric facility never leave the waterbody, unlike WTPs that physically alter and remove the pollutants. The Ninth Circuit has made it clear that the resuspension of pollutants that originally come from a navigable water body constitutes the addition of a pollutant under the Clean Water Act.

In Rybachek v. EPA, 904 F.2d 1276 (9th Cir. 1990), placer miners argued that they do not "add" pollutants to navigable waters of the United States within the meaning of the Clean Water Act. Id. at 1285. In rejecting this argument, the Ninth Circuit concluded;

> *even if the material discharged originally comes from the streambed itself, such resuspension may be interpreted to be an addition of a pollutant under the Act. See Avoyelles Sportsmen's League, Inc. v. Marsh, 715 F.2d 897, 923 (5th Cir. 1983) (stating that "[t]he word 'addition', as used in the definition of the term 'discharge,' may reasonably be understood to include 'redeposit'")*

Rybachek, 904 F.2d at 1285-86.

Technology-Based Considerations Independent of Water Quality

The Clean Water Act (CWA) set a national goal of zero discharge of pollutants and a way to achieve this goal through technology-based treatment. Recognizing that technology-based treatment would not produce zero discharge immediately and would not always be protective of receiving waters, water quality-based standards were also set. The important distinction between these approaches is that technology-based treatment considerations were not dependent on receiving water conditions but require an industry to apply reasonable treatment without regard to the impact of a discharge on a specific water body. It is instructive to consider the performance standards that have been developed by the United States Environmental Agency (EPA) for industrial categories. These are national standards and as such are not based on the water quality of specific receiving waters but on industry wide characteristics and treatment options. Although the EPA has not developed performance standards for water treatment plants (WTPs), this same process of evaluating industry wide characteristics and treatment options would apply to a case-by-case determination of technology-based limits for an individual facility.

Determining Technology-Based Limits

In the case of WTPs, there is a substantial amount of information available on technology-based determinations. In a WTP general permit just developed by Ohio EPA, and in WTP general permits issued by other states in the last few years, limits are consistently being set on the suspended solids in the wastewater discharge. Although the amount of suspended solids allowed varies some, from about 15 mg/L monthly average to 50 mg/L daily maximum, the limits all reflect treating the discharge to remove residual solids before discharge.

The EPA commissioned Science Applications International Corporation (SAIC) to draft a model permit for the water supply industry. SAIC released their findings in a document entitled *Model Permit Package - Water Supply Industry*, January 30, 1987. In this document SAIC conducted both best practicable control technology (BPT) and best conventional pollutant control technology (BCT) analyses which addressed "conventional" pollutants. Best available control technology economically achievable (BAT) requirements, which address "toxic" pollutants, were not developed since WTP process effluent is characterized as principally containing conventional pollutants, with insufficient evidence of toxic pollutants for development of across-the-board limits. SAIC proposed limits based on their "Best Professional Judgment" after considering existing permits and WTP monitoring data and achievable WTP wastewater treatment levels.

In determining technology-based limits for the WTPs in Washington State, considerations were based on the references above, a review of facilities currently permitted by the State, telephone interviews with additional facilities operating in the State, current and past policies of Ecology, a review of the literature, and site visits. This approach provided the necessary information for developing technology-based treatment requirements and addressed both the spirit and intent of the CWA and the factors that must be considered when making a case-by-case determination.

Total Cost vs. Effluent Reduction Benefits

The BPT economic reasonableness test evaluates the cost of applying a treatment against the **amount of pollutants removed**. The BPT economic reasonableness test is not an evaluation of cost versus environmental benefits received. If the treatment is very effective, then it is likely to be acceptable. The intent of the BPT cost-benefit requirement is to avoid requiring wastewater treatment where the additional degree of effluent reduction is wholly out of proportion to the costs of achieving such marginal level of reduction. The EPA weighs more heavily the cost per pound of pollutants removed by the treatment technology than the effect of the annual cost of the treatment technology on the profitability of the facility. Settling solids is very effective treatment for WTP wastewater, resulting in very low costs per pound of solids removed.

The intent of the CWA has been to give the EPA broad discretion in considering the cost of pollution abatement in relation to its benefits and to preclude the EPA from giving the cost of compliance primary importance. An economic analysis, however, does include a consideration of the impact on prices, production, employment, profits, and the ability to finance expansion and pass costs on to consumers. In the case of WTPs, for instance, not providing drinking water is not a viable option and, therefore, the costs associated with technology-based treatment could never be so great that drinking water would no longer be considered affordable.

A BPT consideration must include a review of the treatment options that are available, the effectiveness of the treatment options, and the cost of treatment. There is not a wide range of

treatment options for backwash and sedimentation solids. WTPs either do not treat the wastewater at all or they incorporate some type of solids settling strategy. Settling retention time may be for no more than an hour in a settling basin or it may be hours to days in one or more lagoons. For most WTPs that do incorporate wastewater treatment, settling has been very effective. Ninety percent or more of the solids can be expected to be removed from the effluent by settling. The cost associated with this removal appears to be reasonable. Based on a twenty (20) year cost averaging, $100/dry ton or 5 cents a pound, was the estimated cost for one large facility to acquire land, design and build the lagoon, and pay operation and maintenance and disposal costs. A medium sized facility, around 18,000 customers, estimated that their costs to design, build, and operate resulted in a 0.7% to 1% rate increase (based on a 20-year cost recovery). Twelve of the fifteen WTPs in this State that have had NPDES permits currently provide solids settling treatment. It would appear that, at least for most facilities, the costs incurred from implementing treatment can be covered by a water rate that is affordable.

While this BPT determination found the cost of settling solids effective and economically reasonable, the current level of treatment required by the CWA is BCT. In determining the level of treatment which represents BCT it is assumed that BPT has been established and is in place. As a result, when evaluating BCT it is the marginal cost and treatment effectiveness of going beyond BPT which is evaluated.

BCT has a very specific economic test to determine cost effectiveness. It is a two part test and the increased level of treatment must meet both parts. These tests are applied to treatment options that could further reduce the amount of pollutants discharged. Ecology agrees with the SAIC report that the treatment options available beyond BPT to further reduce the amount of pollutants in WTP wastewater discharge will not pass the BCT economic test and, therefore, BCT treatment requirements are presently considered to be the same as BPT.

Age of Equipment and Facility

Treatment technology utilized at WTPs has not changed significantly in many years. WTPs continue to use the basic operation of solids removal through simple settling. Age is not a relevant factor because age does not affect either the characteristics of the process wastewater or the treatment of wastewater. Therefore, the age of facilities is not a factor in the development of technology-based limits.

Process Employed

Operations used for settleable solids removal are essentially the same in all WTPs. Although wastewater quality and quantity may vary from plant to plant, residual solids removal technology is equally applicable to all WTPs and similar final effluent concentrations of settleable solids should be achieved by all WTPs. Therefore, processes employed are not a relevant factor in the development of limits for settleable solids.

Engineering Aspects

Operations used for settleable solids removal will be substantially the same at all WTPs, with the exception of capacity from plant to plant. The settleable solids technologies in use are well known and feasible in their application. Therefore, the design and construction of appropriate treatment facilities are not relevant factors in the development of limits for settleable solids.

Process Changes

There are no limitations being considered that are based on process changes at WTPs. Therefore, this factor is not significant in evaluating subcategorization in this industry.

Non-Water Quality Environmental Impact

Non-water quality environmental impacts of WTP waste and wastewater treatment processes include residual solids disposal, air pollution, and energy consumption.

The major non-water quality environmental impact of WTP treatment processes is residual solids disposal. Residual solids consist of fine sands, silt, clay, and various organic materials. Coagulation residuals and iron and manganese removal residuals are usually nontoxic and may be safely land applied. Ecology encourages the application of residual solids to a beneficial use rather than to a landfill. Beneficial use can include incorporation in the production of a product such as concrete, direct application to soil at an approved agronomic rate, or as a component of a soil mix. Because land application and other beneficial uses are available for disposal of this nontoxic material, residual solids disposal is not a limiting factor in technology-based treatment considerations.

Implementation of sedimentation technologies have minimal, if any, air pollution impacts, and is therefore not a limiting factor in developing effluent limits.

Solids settling is not energy intensive, nor is removal exceptionally energy consumptive compared to the solids removed. Energy consumption is not a significant factor in the development of technology-based effluent limits for this industry.

APPENDIX E - ION EXCHANGE AND REVERSE OSMOSIS

Issue

Wastewater discharges from Ion Exchange (IX) and Reverse Osmosis (RO) are very high in total dissolved solids (TDS) and may contain specific ions of concern such as arsenic (arsenite, arsenate) or nitrate. Ecology proposes an approach to assess the environmental impact of these discharges and provide guidance on best management practices and permitting requirements.

Background

Ion exchange/inorganic adsorption uses resins and other media to remove cations/anions when more inexpensive solutions can not remove the undesirable substance. IX can be used to soften water (remove hardness) and to remove inorganics (e.g. nitrates, iron, manganese, barium, arsenate, selenate, fluoride, lead, chromate, radionuclides). The typical IX systems in use in Washington State are the water softener type and are used primarily by single domestic systems and some small, group domestic systems (less than 500 residential connections). Although these IX systems remove hardness, they are most frequently employed to remove dissolved iron and manganese from ground water. When the resins become saturated with iron and manganese ions, they must be regenerated with a concentrated brine, typically salt brine (most often sodium chloride (NaCl) but potassium chloride can also be used). IX system wastewater discharge is composed of brine, dissolved iron and manganese, and rinse water, with a volume that is 1.5 to 10.0% of the raw water. The discharge from an average single domestic IX unit can be characterized as:

Discharge	7,000 gal/yr
TDS	15,000 - 35,000 mg/L
Salt	312 lbs/yr
Total Iron:	100 to 200 mg/L
Total Manganese:	70 to 100 mg/L

Oxidative filters such as greensand are not ion exchange systems. These filters act as catalysts and facilitate chemical reactions (e.g. oxidation of manganese) and require continuous or periodic activation with an oxidant such as potassium permanganate, but result in the filtration of a precipitate (iron oxide, manganese oxide). The nature and characteristics of the filter backwash from these systems is much more consistent with other filtration processes than with the discharge from IX.

Reverse osmosis uses water under pressure and semipermeable membranes to separate water and dissolved solids. It is one of several membrane processes (e.g. reverse osmosis, ultrafiltration, nanofiltration, microfiltration, and electrodialysis/electrodialysis reversal) which are used to treat water. Raw water (feedwater) is usually pretreated which may consist of filtering, adding an antiscalant, and adjusting pH to 5.5 to 7.0. RO is very effective in removing dissolved salts but has a high wastewater discharge volume (up to 80% of the raw water volume) which is very site-specific in composition but typically has a concentrated salt content and may classify as brine. RO is also very effective at removing hardness ions, dissolved organics, undesirable color, trihalomethane precursors, specific inorganics and radionuclides.

There are very few RO systems currently in operation in the State and none of those identified had more than 100 residential connections. However, it is expected, that RO desalination will

become more common in the State in order to meet increased water demand for limited freshwater resources. RO technology is also advancing providing improved membranes and units designed to meet a variety of applications from small point-of-use models producing from 5 to 30 gallons per day and operating on water line pressure to large municipal units producing from 150,000 to 5 million gallons per day. The discharge from a typical RO unit can be characterized as:

	Point-of-Use	Point-of-Entry	Municipal
Wastewater (% of raw water)	70 to 90%	15 to 25%	10 to 25%
Average TDS (raw water, brackish)	15,000 mg/L	40,000 mg/L	50,000 mg/L
Average TDS (raw water, salt water)	20,000 mg/L	50,000 mg/L	60,000 mg/L

Electrodialysis/electrodialysis reversal (EER) is another membrane type process that produces a discharge that would not be eligible for coverage under the WTP general permit and should be disposed of with the same considerations as RO wastewater. It is very effective at desalting brackish water and, depending on the makeup of the feedwater, removing specific inorganics and radionuclides. The pollutants in the wastewater discharge are concentrates of the feedwater and are therefore also site-specific. For example, the salts in brackish feedwater may be concentrated 3 to 10 times greater in the wastewater discharge resulting from the EER process.

Other membrane-type processes include microfiltration, ultrafiltration, and nanofiltration. Microfiltration and ultrafiltration are effective at removing particulates, microorganisms, and larger organics and typically have an associated wastewater discharge that is similar in character to traditional filtration processes. Microfiltration and ultrafiltration would likely qualify for coverage under the WTP general permit because their typical wastewater discharge is similar to filter backwash from conventional filtration processes. Nanofiltration is very effective in removing hardness ions, dissolved organics, undesirable color, trihalomethane precursors, and depending on the feedwater constituents, removing specific inorganics and radionuclides.. Nanofiltration is not likely to qualify for coverage under the WTP general permit because the typical wastewater discharge is similar to RO wastewater. In all cases, the pollutants in the wastewater discharge are concentrates of the feedwater and are site and process-specific. If the process is removing suspended solids, has a maximum production capacity of 50,000 gallons a day or more, and discharges backwash effluent to surface water, then an application for coverage under the WTP general permit needs to be submitted. If the process is removing dissolved solids and discharging wastewater to surface water, then an application for an individual permit needs to be submitted.

Discharge of RO and IX wastewater may be to ground, to POTW, or to surface water. Most single domestic and small group domestic IX systems discharge to ground. A recent telephone survey identified three IX systems with more than 100 residential connections that discharged to ground, one to a POTW, and none to surface water. The State's ground water criteria have been set for regulated contaminant substances including chlorides (250 mg/L), total dissolved solids (500 mg/L), arsenic (0.05 µg/L), nitrate (10 mg/L), nitrite (1 mg/L), and total nitrogen (10 mg/L). Corresponding surface water criteria are set for dissolved chloride (860 mg/L acute, 230 mg/L chronic) and arsenic (360 µg/L acute, 190 µg/L chronic). The beneficial uses of a specific surface water body must also be protected and any RO or IX wastewater discharge that would degrade the water quality, impacting a beneficial use such as water supply, stock watering, or aquatic life would be prohibited.

The composition of the wastewater discharge from an IX process varies greatly from individual system to system. There can be three distinct phases: backflush (plain water used to remove any suspended solids from the resin medium), regeneration (saturated brine solution to reactivate the resins), and final rinse (plain water used to remove the excess brine before production of drinking water resumes). The amount of water used to backflush and to rinse the system versus the concentration and quantity of the brine will affect the concentration of dissolved solids that is discharged in the wastewater. The discharge may also be direct, producing variable concentrations with a peak concentration, or controlled, allowing mixing of the different phases and a timed release of the discharge thereby producing a relatively constant concentration of dissolved solids. Careful analysis is typically necessary to accurately characterize the wastewater discharge of an individual system and to evaluate its impact.

Arsenic Removal

Arsenic contamination of underground sources of drinking water has been documented in at least sixteen counties in Washington State. Generally, it is recognized that the source of arsenic is naturally occurring arsenopyrite and other arsenic-rich minerals located throughout the Cascade foothills and the mining districts in northeastern part of the State. Previous studies of both public and private water distribution systems indicate that in several locations, arsenic concentrations routinely exceed the State Drinking Water Standards of 0.05 mg/L and thereby require treatment. Treatment results in the generation of waste products, which must be properly managed to avoid a negative impact on the environment.

Arsenic is not found in ground water in its elemental form, but rather in the predominate two ionic forms of arsenic, arsenite (AsO^{4-}) and arsenate (AsO^{2-}). Since dissolved oxygen will oxidize arsenite to arsenate, most of the State's ground water contamination in aquifers involves arsenate. However, arsenite is the predominate form in oxygen poor environments such as that found in deeper aquifers or aquifer systems. Arsenic is also found in its pentavalent state as a soluble compound, arsenic acid (H_2AsO_4), in shallow aquifers.

While anionic resins can be used, IX typically uses activated alumina (AlO_3) and has been shown to be effective in removing 90 - 95% of arsenic found in source water. However, pretreatment with a strong oxidant and pH adjustment may be necessary to achieve maximum efficiency, and the alumina column may be regenerated by washing periodically with 4% NaOH to remove captured arsenic. Unfortunately disposal of the wastewater from this regeneration is problematic.

The use of reverse osmosis may be practical for domestic or smaller water systems where the arsenic level in the source water does not exceed 0.10 mg/L, and where extensive oxidative pre-treatment (oxidation) has occurred. However, RO creates a large volume of reject water with 2 to 3 times the source water concentration of arsenic which may create significant disposal problems.

Nitrate Removal

Nitrate contamination of ground water has become an increasing concern in this State. Pregnant women and infants are considered at risk if nitrate levels exceed 10 mg/L. Larger systems that have a nitrate contaminated ground water source will generally have other water sources which are not contaminated and they can blend their sources of water thereby achieving a product that is less than 10 mg/L. Small systems will typically have to treat the water before distribution or at the point-of-use for persons at risk.

IX with strong base resins can be used to remove nitrate from water, but sulfate ions will also be removed which can significantly reduce the efficiency of the IX process. Salt brine (sodium chloride) is used to regenerate the resin and nitrate levels in the spent brine can be as high as 6,000 mg/L. RO can also be used to remove nitrate. The newer polyamide thin-film composite membranes provide improved nitrate rejection over traditional cellulose acetate membranes. Small counter-top and under-counter units are available for point-of-use applications, as are larger point-of-entry units and very large commercial/municipal sized units. If the wastewater discharge from IX or RO is suitable for agronomic purposes, vegetation can effectively treat the nitrates when the wastewater is applied at appropriate agronomic rates and growing conditions.

Considerations - Discharge to Land

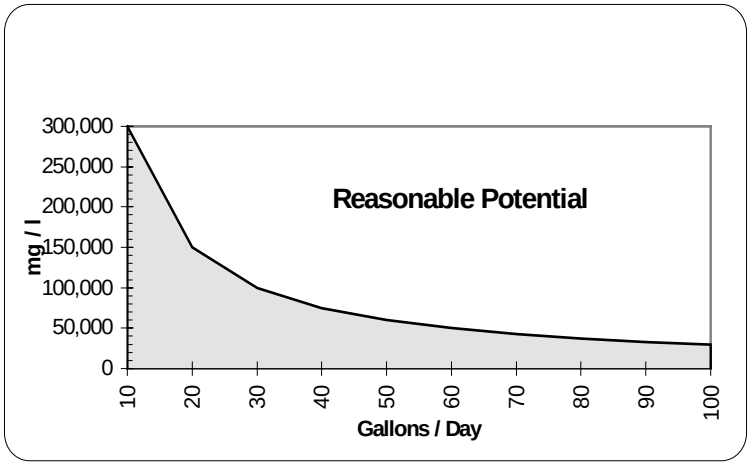
Ion exchange wastewater is typically discharged to land in this State. Wastewater from reverse osmosis may also be discharged to land and if so, the considerations put forth here would be equally applicable to an RO discharge. IX/RO wastewater discharges to land include discharges to an infiltration pond/trench, drain field, swale, or land irrigation. While the soil and vegetation may afford some treatment, pollutants have a reasonable potential to reach ground waters of the State. Treatment options to remove or reduce the dissolved solids before discharge to land are unavailable or economically prohibitive. *The Ground Water Quality Standards* (Chapter 173-200 WAC) establish a criteria of 250 mg/L for chloride and 500 mg/L for total dissolved solids. Criteria are threshold limits which should never be exceeded in ground water. However, the criteria are not the ground water protection goal for ground water quality. The standards also contain an antidegradation policy which protects existing high quality ground water. Therefore, the intent is to protect existing conditions and not allow ground water degradation beyond the criteria. These standards protect all ground water in the saturated zone and their protection is not limited to drinking water aquifers.

The charts below represent the results of several computer modeling exercises designed to predict a “worst case” scenario regarding the potential impact to ground water of salt brine wastewater discharges with no attempt to factor in retardation or sorption. Modeling assumed that the contaminants of concern were secondary contaminants (e.g. chloride, manganese, and iron) and that there would be no more than one source in a quarter acre area. Modeling also is based on not exceeding ground water criteria but would not necessarily protect the background water quality of all aquifers. The charts depict the impact in gallons per day versus the total dissolved solids of the discharge. The results are based on general dispersion characteristics found in typical aquifer media within the State and are intended to identify those discharges where further consideration is necessary. Those IX/RO wastewater discharges that fall above the line on the charts are considered to have a reasonable potential to violate the State’s ground water standards, while those below the line are unlikely to do so.

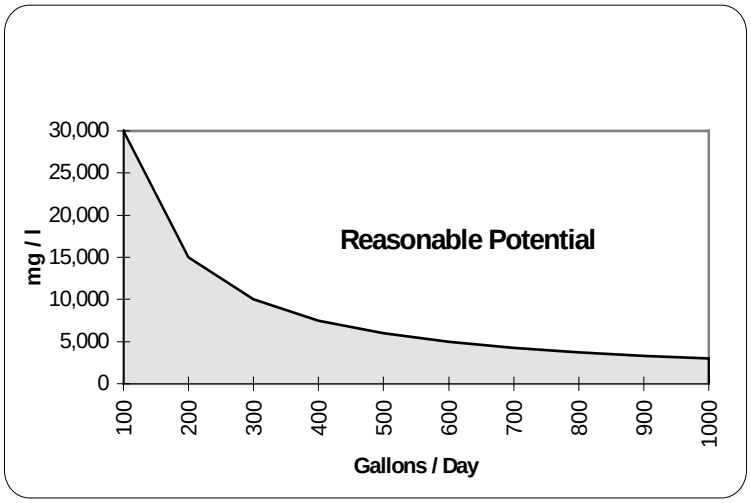
Computer modeling indicated that the discharge of 25 pounds or more of salt per day showed reasonable potential to exceed the State’s ground water standards under typical conditions. However, a more conservative reasonable potential test may be necessary for some exceptionally sensitive areas such as a shallow aquifers, highly permeable soils, or aquifers with limited recharge or saltwater intrusion. This reasonable potential test is also limited to IX/RO processes where there is no significant removal of primary contaminants. A much more conservative analysis of reasonable potential would be required for the removal of primary contaminants such as arsenic and nitrate.

Potential to Pollute Ground Water

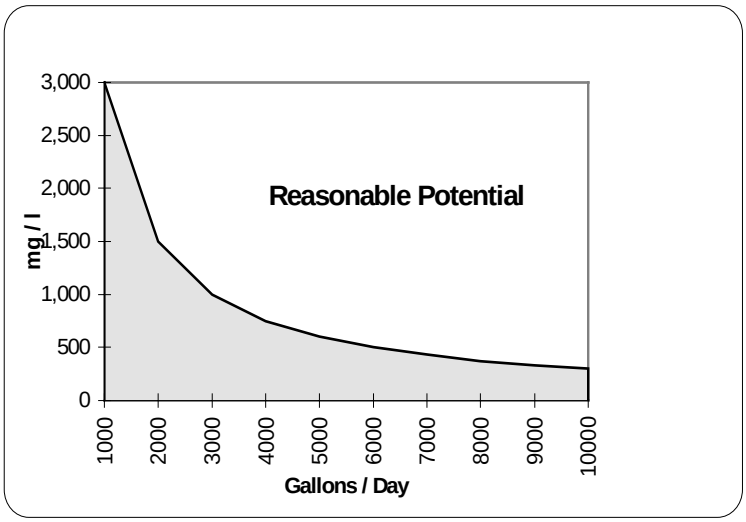
Wastewater Discharge	
Gal/Day	TDS - mg/L
10	300,000
20	150,000
30	100,000
40	75,000
50	60,000
60	50,000
70	43,000
80	37,000
90	33,000
100	30,000



Wastewater Discharge	
Gal/Day	TDS - mg/L
100	30,000
200	15,000
300	10,000
400	7,500
500	6,000
600	5,000
700	4,300
800	3,700
900	3,300
1000	3,000



Wastewater Discharge	
Gal/Day	TDS - mg/L
1000	3,000
2000	1,500
3000	1,000
4000	750
5000	600
6000	500
7000	430
8000	370
9000	330
10000	300



For IX removal of arsenic, the most cost effective and environmentally responsible method of management of the concentrated arsenic appears to be the disposal of spent resin/alumina column without regeneration. Arsenic contained in this waste product is likely to be stable enough for disposal in a "351" municipal solid waste landfill. It may also be possible to market the solid waste to industry or recycling operations. If this occurs, the arsenic ceases to become a waste and instead becomes a product and is thereby removed from the dangerous waste regulations.

Considerations - Discharge to POTW

Saltwater brines from IX or RO treatment systems can have an adverse impact on a POTW (sewage treatment plant and its delivery system). The typical discharge is high in chloride ions and may be corrosive to materials it contacts, especially concrete components and metal surfaces

which are particularly vulnerable to corrosion from the salt brine. The impact of the wastewater discharge will be influenced by: the total discharge volume and flow rate; the hydraulic capacity of the POTW; the peak and average concentration of dissolved solids; and the size, age, and physical characteristics of the sewer collection system.

A discharge to a POTW from IX/RO systems which remove toxic substances such as arsenic are typically unacceptable. Additionally, biological processes of the treatment works may be adversely impacted if the concentration at the headworks of the POTW of some compounds typical to IX/RO wastewater discharges exceed acceptable levels. The threshold concentrations of concern are listed in the table below. These concentrations far exceed typical domestic wastewater concentrations and set reasonable potential for concern at 25% of levels that have been recognized to cause inhibition.

Compounds	**Threshold Concentration of Concern As Measured at Headworks of the POTW**
NaCl (Sodium Chloride)	2,500 mg/l (Kincannon, PhD theses OK State U., 1965) & (Lawton / Eggert JWPCF #29, pp 1228-1242)
Na + (Sodium ion)	2,000 mg/l (Kugelman & McCarty, 1964*)
K+ (Potassium ion)	3,000 mg/l "
Ca++ (Calcium ion)	2,000 mg/l "
Mg++ (Magnesium ion)	500 mg/l "

* See the 1964 Proceedings of the 19th Industrial Waste Conf., Purdue University, pp 667-686.

References cited in *Federal Guidelines: Pretreatment of Pollutants Introduced Into Publicly Owned Treatment Works*, October 1973

Considerations - Discharge to Surface Water

Federal and State law requires an NPDES permit for wastewater discharge to surface waters. A discharge of wastewater from desalinization processes to salt water may pose no environmental threat. However, without significant dilution, discharge of wastewater from IX/RO treatment systems to freshwater will likely violate the State's surface water quality standards as stipulated in Chapter 173-201A WAC. The discharge of high levels of dissolved solids to freshwater can

have a negative impact on aquatic life and can degrade the water quality limiting water supply and stock watering uses. Likewise, the discharge of wastewater high in arsenic or nitrates is likely to degrade the receiving water quality and impair uses associated with the surface water body.

Conclusion - Discharge to Land

Land application will most often be the best disposal option for wastewater from ion exchange systems that remove iron and manganese. RO wastewater discharges may also be land applied if the discharge does not contain significant levels of any toxics or ground water primary pollutants and the volume and concentration of dissolved solids does not demonstrate reasonable potential to contaminate ground water. Small IX/RO systems that discharge wastewater containing less than 25 pounds of salt per day (see charts above) do not typically demonstrate reasonable potential to violate ground water criteria for chloride and total dissolved solids and, therefore, will not typically be required to apply for a State Wastewater Discharge Permit. Ecology may require such a discharge permit, however, if the discharge is to a shallow aquifer, highly permeable soils, an aquifer with limited recharge, or when ground water quality appears to be threatened. Discharge to a "dry well" is technically underground injection and is prohibited under the State's Underground Injection Control Act, Chapter 173-218 WAC. Discharge to a drain field, infiltration pond or trench although not prohibited, should only be utilized when discharge via land application (irrigation) or into a grass-lined swale is not possible. Wastewater discharges must be properly managed so that there is no reasonable potential to discharge to surface water, cause soil erosion or deteriorate land features.

Discharge to land from single domestic and point-of-use treatment for arsenic will not be prohibited although ion exchange treatment for arsenic without regeneration is recommended. An individual State Wastewater Discharge Permit will be required for systems (excluding single domestic and point-of-use systems) that provide arsenic or nitrate removal treatment either by reverse osmosis or ion exchange with regeneration.

Conclusion - Discharge to POTW

Discharge to POTW from a single domestic or point-of-use IX/RO water treatment system will typically not be required to obtain a wastewater discharge permit. However, larger IX/RO water treatment systems will be required to obtain an individual State Wastewater Discharge Permit (unless they discharge to a POTW that has been fully delegated) under any of the following conditions:

1. They designate as a significant industrial user (SIU) as defined by 40 CFR § 403.3;
2. The wastewater TDS exceeds 20,000 mg/L;
3. The wastewater contains significant levels of toxics (e.g. those from arsenic removal); or
4. Ecology determines that it is necessary for any reason.

IX/RO systems that are not required to obtain an individual State Wastewater Discharge Permit are still required to properly identify the character and quantity of their discharge to the POTW, identify and mitigate potential corrosion problems, and provide discharge control as necessary to minimize any negative impact on the POTW. Failure to do so may result in the requirement to obtain an individual wastewater discharge permit.

Conclusion - Discharge to Surface Water

It is recommended that the wastewater from desalinization processes be discharged to salt water provided the outfall is properly located to assure mixing and avoids environmentally sensitive areas such as estuaries. An application for a wastewater discharge permit shall be submitted to Ecology for all desalinization systems where the discharge of wastewater exceeds 5000 gallons per day.

It is recommended that under most other circumstances, wastewater from RO/IX should not be discharged to surface water. However, if the wastewater discharge (excluding single domestic and point-of-use systems) from RO/IX processes must go to a surface water body, an application for an individual wastewater discharge permit shall be submitted to Ecology.

APPENDIX F - WTP DISCHARGE TO LAND/POTW

Issue - Discharge to Land

No pollutants may be discharged from any commercial or industrial operation into waters of the State except as authorized under a valid wastewater discharge permit. In Washington State, twenty water treatment plants (WTPs) with more than 100 residential connections were identified as discharging wastewater to land. The WTP general permit under development could include WTPs that discharge to land **if that discharge requires a permit**.

Issue - Discharge to POTW

Both Federal law and State law have established permitting requirements to implement the national pretreatment standards for industrial wastewater discharges to publicly owned treatment works (POTWs). The pretreatment standards have been implemented to control pollutants which pass through or interfere with treatment processes in POTWs or which may contaminate sewage sludge. In the State, ten WTPs with more than 100 residential connections were identified as discharging wastewater to a POTW. The WTP general permit under development could include WTPs that discharge to a POTW **if that discharge requires a permit**.

- Is the discharge subject to pretreatment standards under section 307 of FWPCA?
- Are these significant industrial users (SIUs)?
- Are they exempt under WAC 173-216-050?

Background

The WTP general permit is being developed for facilities that have a wastewater discharge from filtration processes. Authorization for discharge from WTPs that employ ion exchange (IX) or reverse osmosis (RO) will not be included in the proposed general permit. Potable water production from surface water or from ground water can employ filtration as part of the treatment necessary to comply with drinking water standards. Typical surface water treatment applies filtration to remove organic and inorganic matter and to remove pathogenic organisms. Typical ground water treatment precipitates dissolved minerals followed by filtration to remove the minerals. Regardless, filters loose their effectiveness as the filtrate accumulates and must be cleaned to avoid breakthrough and unacceptable headloss. Filter cleaning is accomplished by reversing the flow of water and backflushing the filter, producing wastewater composed of the filtrate and backflush water. The filtrate includes substances removed from the raw water as well as additives applied to enhance filtration and the backflush water may include additives such as chlorine. This wastewater is known as backwash and constitutes the majority of the wastewater discharge.

The frequency of discharge is highly variable, from several times a day for large WTPs with several filters to once or twice a week for small WTPs. Likewise, the quantity of the discharge varies somewhat by the size of WTP from about 3,000 gallons to backflush a small filter to 60,000 gallons for large filters. The duration of backwash discharge, however, is relatively constant, about 10 to 15 minutes per episode. Following a backflush of the filter, WTPs may also discharge the filtered water for a period of time while the filter settles and “cures” (filter-to-waste).

Processes can vary depending on the treatment the raw water requires. Treatment of ground water most frequently removes dissolved iron and manganese and typically includes oxidation (e.g. ozonation, addition of chlorine or potassium permanganate) to precipitate the iron and manganese followed by filtration to remove the iron and manganese oxides. The typical backwash from these oxidation/filtration processes can be characterized as follows:

Total Iron:	100 to 200 mg/L
Total Manganese:	70 to 100 mg/L
Total Residual Chlorine (TRC):	0.6 to 1 mg/L

Surface water is most frequently treated by filtration to remove suspended solids and may incorporate presedimentation and sedimentation basins before filtration. Precipitation, coagulation and flocculation are frequently used to increase the effectiveness of filtration and sedimentation. Aluminum sulfate, alum, is the most common additive and is used by WTPs for coagulation. Polymers are another common additive that may be used to enhance coagulation, flocculation, or filtration. Chlorine may be added before filtration as an oxidizing agent for precipitation and to remove unwanted taste and color and is frequently added after filtration for disinfection purposes producing the "finish water" for distribution as drinking water. This chlorinated finish water is typically used to backflush the filters. Filter backwash from standard coagulation/flocculation processes associated with treating surface water can be characterized as follows:

Suspended Solids:	50 to 400 mg/L
Aluminum Hydroxide or Ferric Hydroxide (additive) - 25 to 50%	
Clay/Silt (source water) - 35 to 50%	
Organic Matter (source water) - 15 to 25%	
Total Residual Chlorine, TRC (additive):	0.1 to 1 mg/L

Filtration processes, whether associated with ground water or surface water, remove suspended solids. Neither the physical processes nor process additives tend to add significant levels of dissolved solids or chemicals with the exception of TRC. Suspended solids are the pollutants of concern in WTP process wastewater discharge and they are readily removed by the filtering capacity of the land application site or typical POTW processes.

Considerations - Discharge to Land

Discharges to land are those discharges which are designed to be completely contained by land with no reasonable potential, during all weather conditions, of discharging to surface water. Discharge to land includes discharges to a drain field, infiltration pond/trench, swale, or land application (irrigation) as long as the discharge is contained and there is no overflow or runoff to surface water. Surface water includes all lakes, rivers, ponds, streams, inland waters, salt waters, and associated intermittent streams and wetlands.

Chlorine can combine with organic material in water and produce toxic and carcinogenic byproducts, trihalomethanes, which are regulated under the State's water quality standards as well as by the Washington State Department of Health (Health). The State's drinking water standards prohibit these substances to exceed certain maximum levels in the finished product (potable water). The WTP process wastewater should contain these chlorine-related substances at a concentration level that is very close to that found in the potable water and those

concentrations are unlikely to exceed water quality standards. Residual chlorine may also be found in the process wastewater. Because of its highly reactive and volatile nature, however, it will quickly dissipate and it is highly unlikely to persist and pollute ground water.

"Toxics in toxic amounts" should not be found in additives used by the WTP industry. ANSI/NSF Standard 60 defines requirements for the control of potentially adverse human health effects from products added to drinking water for treatment. Only certified chemicals that meet Standard 60 requirements are acceptable for use in the treatment of drinking water. Certification assures that water treatment chemicals will not exceed a maximum allowable limit which, in general, is set at 1/10th of the maximum contamination level (MCL) set by the EPA for drinking water and 1/10th of the maximum drinking water levels (based on toxicological criteria) for unregulated contaminants.

Total dissolved solids (TDS) are not typically increased by filtration processes and should not be a problem for WTP process wastewater unless the source water (raw water) is already unacceptably high in TDS. Likewise, "toxics in toxic amounts" do not typically result from water treatment processes unless the source water has significant levels of toxics. Because the product is drinking water, it is highly unlikely that the source water would contain significant concentrations of toxics or high levels of TDS.

While it is true that detention ponds, whether lined or unlined, as well as infiltration ponds and drying beds have the potential to discharge to ground water, the question is whether that discharge will contain pollutants. Because the primary pollutants are suspended solids they are likely to be filtered by the ground and are not likely to reach ground water. Under typical conditions it is also highly unlikely that there will be contaminants in the source water or from process additives that will persist and be carried to ground water.

Health, however, has implemented a risk reduction/ pollution prevention wellhead protection policy which would prohibit the discharge of filter backwash within the short-term recharge areas of public drinking water wells. While there does not appear to be a significant probability of chemical pollutants that would affect the ground water quality and compromise drinking water standards, there is some concern about the possibility of microbial pathogens in the discharge. Therefore, all infiltration ponds or trenches should be located outside of any delineated one-year time-of-travel wellhead protection areas.

GROUND WATER AS SOURCE WATER

Ground water frequently contains dissolved iron and manganese at concentrations that require removal to meet drinking water standards. Iron and manganese are precipitated as relatively stable oxides that are considered nonmobile under typical aerobic conditions and soil will act as a filter, preventing the wastewater discharge from carrying the oxides to ground water. However, nonmobility is not as certain when quantities of these precipitates build up in the soil, are exposed to anoxic conditions and thereby become soluble and likely to migrate to ground water. Appropriate removal and disposal of the residuals is necessary to assure that the iron and manganese do not become mobile and pollute waters of the State.

SURFACE WATER AS SOURCE WATER

Surface water is typically treated by filtration to remove silt, clay, organics, and pathogens and when the filtrate is discharged to land, the soil itself will act as a filter making it unlikely for these substances to be carried to ground water. However, material from this discharge could be carried to ground water if the residual solids are allowed to build up and acidic or anoxic conditions develop. Additionally, land application of alum residuals could cause a reduction in available phosphorus, however, application rates of up to 7.34 tons/acre-year should not cause environmental degradation. Therefore appropriate management and disposal of the residual solids is necessary to assure that the residual solids remain nonmobile and do not pollute waters of the State.

Considerations - Discharge to POTW

Under Federal law, pretreatment may be required of any industrial user that discharges to a POTW and has the potential to introduce pollutants that will pass through the POTW or interfere with the operation of the POTW. This control may be effected by issuing a wastewater discharge permit and for significant industrial users, a permit or equivalent individual control mechanism must be issued. Significant industrial users (SIUs) are: (1) all industrial users that are subject to categorical pretreatment standards; (2) industrial users that discharge an average of 25,000 gallons per day or more of process wastewater; (3) industrial users that contributes a wastestream which makes up 5 percent of more of the average dry weather hydraulic or organic capacity of the POTW; or (4) industrial users which are designated as such. Although WTPs are not designated as subject to categorical pretreatment standards, some of the WTPs in Washington State do discharge an average of 25,000 gallons per day or more of process wastewater. These WTPs would qualify as SIUs unless there is a determination that there is no reasonable potential to adversely affect the POTW's operation and the discharge will not violate any pretreatment standard or requirement. Such a determination appears appropriate based on the characteristics of this wastewater discharge.

Filter backwash from WTPs should not introduce pollutants that will pass through the POTW. Backwash contains solids that are typically nontoxic and will readily settle out at the POTW. It would be possible if the raw water contained a substance such as arsenic, that that substance could be concentrated by the filtration process and contaminate the sewage sludge. It is highly improbable, however, that any raw water that can be treated to meet drinking water standards would contain contaminates at levels that would have this result. It would also be possible to cause hydraulic loading problems if a large WTP were discharging to a small POTW and discharges from WTPs can overload delivery systems if the sewer system is operating near design capacity or undersized for the instantaneous flow of backwash. Filter backwash may also be more abrasive than typical sanitary wastes, resulting in a reduced life span for pumps and other system components.

Five WTPs that currently discharge to four POTWs were interviewed as were the POTWs receiving the discharge. Two of the POTWs are activated sludge facilities and two utilize nonmechanical lagoon treatment. None of the POTWs have experienced any plant upsets or other difficulties resulting from the WTP discharges. Only one of the WTPs discharges backwash directly to a sewer line; all the others discharge to a tank or pond and then use a pump or gravity flow to drain the effluent into the sewer line. A tank or pond allows some control over

the discharge rate into the sewer line which in two cases was necessary to avoid overloading the sewage delivery system. One WTP also timed their discharges to avoid peak flows in a delivery system that was approaching design capacity.

One WTP has tested the amount of total suspended solids (TSS) in their effluent and compared it to TSS in the POTW influent. Both had concentrations that varied between 170 to 320 mg/L demonstrating a similarity to domestic wastewater. WTP wastewater is typically low in organic content, does not contain significant levels of BOD or COD that would be of concern, and has a relatively neutral pH range. WTP process additives are not likely to introduce any toxicity of consequence nor interfere with POTW operation. Polymers used in WTP processes are similar in nature and function and sometime the same as those polymers used by POTWs. Settling of solids can occur in sanitary delivery lines but this is no more likely than typical sanitary wastes. WTP wastewater may be more abrasive than typical sanitary wastewater but requires no special delivery system other than a delivery system that is appropriately sized for flow demands. Typical WTP wastewater does not appear to pose any operational concern for those POTWs that have the capacity to accept the wastewater.

Conclusion - WTP Discharge to Land

Based on current information, WTPs that discharge process wastewater from filtration processes associated with the production of potable water shall be conditionally exempt from State-based permit requirements for discharge to ground. This exemption will be subject to periodic review of WTP processes and discharge characteristics, and the following conditions must all be met:

1. Discharge must be free of additives that have the potential to reach waters of the State;
2. Infiltration ponds/trenches must have sufficient free board to prevent over-topping and be managed so that there is no reasonable potential to discharge to surface water;
3. Discharge must not result in unmanaged soil erosion or deterioration of land features;
4. Residual solids that accumulate in infiltration ponds/trenches must be disposed of as necessary to avoid a build up and concentration of these materials; and
5. Disposal of solids must be consistent with requirements of local health department.

Conclusion - WTP Discharge to POTW

WTPs are not subject to categorical pretreatment standards and typical discharge does not have reasonable potential to adversely affect the POTW's operation or introduce pollutants that will pass through the POTW, nor will it violate any pretreatment standard or requirement. Therefore it is reasonable to conclude that WTPs are not significant industrial users and hence are not inherently subject to permit requirements under Federal law. Typical process wastewater from filtration processes has about the same concentration of suspended solids as domestic wastewater, with lower BOD and fewer pollutants than domestic wastewater. The strength and character of the effluent is no greater risk to the POTW than normal domestic wastewater. Therefore, WTP wastewater discharge is not necessarily subject to permits under chapter 173-216 WAC.

WTPs that discharge process wastewater from filtration processes associated with the production of potable water shall be conditionally exempt from State-based permit requirements for indirect discharge to non-delegated POTWs (have not received the authority to issue permits under RCW 90.48.165). This exemption will be subject to periodic review and the following conditions must all be met:

1. The POTW has agreed to accept the wastewater; and
2. Process wastewater discharge will not overload the delivery system or design capacity of the POTW.

State-based discharge permit decisions are not applicable to a POTW that has received the authority to issue permits under RCW 90.48.165 (delegated POTW). This proposal has no effect on and is not intended to affect any requirements of WTPs by municipalities with delegated authority.

APPENDIX G--RESPONSE TO COMMENTS

Public Involvement

In February of 1997, Ecology formally announced its intention to develop a wastewater discharge general permit for water treatment plants. Public notice of this determination was issued in the Winter 1996/1997 issue of *Confluence* (Washington State Department of Ecology quarterly newsletter), in the March 1997 issue of *Water Tap* (Washington State Department of Health drinking water newsletter), in a mailing to water treatment plants that were likely candidates for coverage under the proposed general permit, and via Ecology's home page on the Internet.

A workgroup of interested parties was formed to provide comments and recommendations during the development of the draft general permit and fact sheet. The workgroup was composed of volunteers from the regulated community both administrators and operators, and representatives of state and local government. This group met three times, completing its work in July.

On October 1, 1997, Ecology caused a Public Notice of Draft to be published in the State Register, the Vancouver Columbian, the Seattle Times, the Seattle Daily Journal of Commerce, the Tri-City Herald, the Spokesman Review, and the Bellingham Herald. The Public Notice informed the public that the draft permit and fact sheet were available for review and comment, that a public hearing would be held on November 7, 1997, and that the public comment period would close on November 14, 1997.

Public Comments

No testimony was provided at the public hearing. Two parties submitted written comments. The complete text of these comments and Ecology's response is provided below:

COMMENT 1**:**

> Page 5 of Draft Permit, *S1. Permit Coverage* -- The Fact Sheet explains that individual NPDES permits might still be appropriate for those WTPs "Which require more detailed guidance, or when an individual WTP so desires and Ecology approves" (page 2 of Fact Sheet). We agree that certain WTPs will present unique issues that can best be accommodated by an individual permit.
>
> The present applicability criteria in S1.A. is encompassing and would require all WTPs to apply for coverage through this General Permit. An option consistent with the Fact Sheet discussion should be crafted and added to Special Condition S1. More specifically, a subsection needs to identify the "off-ramp" criteria for individual WTP permitting.

RESPONSE:

> Page 21 of Draft Permit, *G18. Requests To Be Excluded From Coverage Under A General Permit* -- This general condition outlines the procedure by which a facility may request exclusion from coverage by a general permit in favor of an individual permit. S1.A. sets coverage under the general permit as the default for water treatment plants that meet the listed criteria. Criterion S1.A.1. limits coverage to water treatment plants where the treatment and distribution of water is the "primary function of the facility". This would not include water treatment works that are a part a facility that has a wastewater discharge permit for all the processes of the facility as a whole.

We agree that the "off-ramp" criteria for individual WTP permitting must be identified but believe the permit should reflect the conditions for coverage and not attempt to cover all the possible exceptions. The Fact Sheet is the appropriate vehicle to explain off-ramp criteria, however, a footnote will be added to S1.A.1. to clarify the intent. The footnote will state, "primary function of the facility" means that the water treatment works are not part of a larger, permitted facility (e.g. pulp and paper mill).

COMMENT 2**:**

Page 8, *S3.B. Effluent Limits, Existing WTP Facilities* -- The Fact Sheet acknowledges that some WTPs may not be able to meet the 0.1 ml/L average monthly limitation due to heavier filter backwash requirements arising from higher seasonal solids loadings in raw water (page 7). A more extreme discharge condition will occur with the periodic cleanout of sedimentation basins. No recognition is given in the Fact Sheet discussion to this necessary activity at most facilities. A daily maximum limitation of 0.2 ml/L will likely not accommodate either of these operating conditions.

Ecology will expect permittees to continually comply with the limitations established in this permit. As such, the agency is obliged to evaluate all the anticipated raw water and WTP operating conditions when setting technology-based effluent limitations, not just those reflecting "normal" conditions. With a more complete set of information, different limitations might emerge. Creative approaches might include variable seasonal discharge limits which trigger on raw water solids loading, and discharge conditions specific to the sedimentation basin washout activity.

RESPONSE:

The Fact Sheet does document a concern that was raised by a member of the workgroup that under conditions where the source water is extremely turbid, backwash may exceed the design capacity of settling treatment. The conclusion, however, is that there are no data from State facilities documenting such a problem. The available data suggest that facilities will be able to achieve compliance with the proposed technology-based limits. The workgroup supported the conclusion that there is no basis at this time to justify variable limits.

Ecology does not agree that washdown of sedimentation basins creates conditions which would justify variable limits for this event. Although sedimentation basin washdown will have a high concentration of solids, these solids will settle readily and the settling basin should be designed to accommodate this predictable event. Timing of the event can also be controlled to avoid periods of high volumes of backwash. Consideration of the technology-based limits included a review of data for State facilities, a review of literature, the model permit proposed by SAIC, and an examination of general permits developed for this industry by other states. No basis for variable limits to accompany sedimentation basin washdown was found. No Change

COMMENT 3**:**

Page 8, *S3.B Effluent Limits, Existing WTP Facilities* -- The Fact Sheet offers that the treatment to remove solids from raw water has a collateral benefit in reducing the filter backwash total reduced chlorine, typically from as much as 1.0 mg/L to 0.3 mg/L (page7). Weyerhaeuser's WTPs in Washington do not demonstrate this response. Raw water chlorinated to slightly over 1.0 mg/L will invariably yield filter backwash waters having a

comparable residual chlorine concentration. Dechlorination technology would be required to achieve a 0.3 mg/L result.

We suggest your database be reevaluated to determine the accuracy of the conclusion. A mention should be made on the need for at least some WTPs to provide a dechlorination system to meet the proposed limits.

More fundamentally, we question whether a technology-based decision to set the effluent limit at 0.3 mg/L can be supported. As a point of comparison, the great majority of Ecology-issued NPDES permits to POTWs list the technology-based residual chlorine limit as a narrative requirement to minimize chlorine use to that necessary for meeting the fecal coliform limitation. Some permits do include a numeric water quality-based effluent limit.

RESPONSE:

Total residual chlorine (TRC) data for State facilities are limited but the available data do support the technology-based effluent limit. Facilities without a treatment pond will typically find TRC levels at 0.6 mg/L or greater and those with treatment will typically demonstrate TRC levels of 0.1 to 0.3 mg/L. A compliance schedule is included in the proposed permit. All existing facilities will have one year to assess their effluent characteristics. An additional two years are provided if treatment and/or process changes are necessary to achieve compliance.

A comparison to POTWs does not provide related data. POTWs add chlorine to effluent that has already received treatment, shortly before discharge, and its purpose is to assure compliance with the effluent fecal coliform limitation. WTPs chlorinate to comply with drinking water requirements and TRC levels are highest before treatment of filter backwash (solids settling) begins. Reduction of TRC levels as a result of detention time associated with wastewater treatment is a reasonable expectation for WTPs. No Change

COMMENT 4**:**

Page 10 and 11, *Special Condition S4., Monitoring Schedule* -- The requirement to monitor for the list of pollutants (both Group 1 and Group 2) at the point of discharge largely misses the regulatory mark. The relevant need is to demonstrate the ability of the WTP discharge to meet surface water quality criteria. Discharge data alone fall short of addressing that question and requires another assessment process to determine whether water quality criteria are met.

Rather than requiring monthly or quarterly monitoring events over permit years 4 and 5 for flow, turbidity, dissolved oxygen and temperature, Ecology should simply ask that a receiving water study be completed. Direct information from a properly designed and implemented study will yield empirical information relevant to the regulatory question. An assessment for residual chlorine and pH should be added to the scope of the study to allow for a determination of water quality criteria attainment.

RESPONSE:

We appreciate the concern for protecting the water quality of receiving waters which of course is the regulatory mark. The generic nature of a general permit, however, is not well suited to site-specific studies. Monitoring frequency and duration were set to provide sufficient data at minimum economic impact. This approach enables Ecology to characterize the effluent for the industry as a whole so water quality-based limits can be evaluated for possible inclusion at reissuance of this general permit. The expectation is

that effluent characteristics will be similar between facilities and if reasonable potential to violate water quality standards exists, appropriate limits can be set that would apply to the industry as a whole. No Change

COMMENT 5**:**

Pages 10 and 11, *Special Condition S4., Monitoring Schedule* -- Section S4 should explicitly reference section WAC 173-201A-100 *Mixing Zones* as applicable to the discharge authorized by this General Permit.

RESPONSE:

A mixing zone is associated with water quality-based effluent limits as outlined in Chapter 173-201A WAC. Water quality-based determinations for the water treatment plant general permit have been deferred until permit reissuance. In the absence of water quality-based limits, a mixing zone is meaningless. This issue will be addressed when the general permit is reissued. No Change

COMMENT 6**:**

Pages 24-27, *Fact Sheet* -- We appreciate the recognition that individual permits must follow the regulatory process established in 40 CFR Part 125.3(d) in developing case-by-case effluent limitations. Less clear is the agency conclusion that RCW 90.54.020(3)(b) conflicts with the Federal Clean Water Act. The NPDES regulation at 40 CFR 122.45(g) clearly provides for technology-based effluent limitations to be adjusted to reflect credit for pollutants in the intake water. How this section fits with the court decision referenced in the Fact Sheet is not clear without further analysis.

RESPONSE:

Ecology finds that the discharge of raw water clarifier sludge generated from the treatment of intake water is specifically excluded from adjustment for pollutants in the intake water (40 CFR 122.45(g)(5)). Further, that a reasonable application of federal requirements for dischargers to achieve both best practicable control technology (BPT) and best conventional pollutant control technology (BCT) concludes that solids settling is an industry standard and the proposed limits reasonably reflect what is achievable by standard treatment. Finally, case law has established that the removed substances do constitute pollutants and their discharge is subject to regulation under NPDES. No Change

COMMENT 7**:**

Applicability to non-water treatment facilities. While this permit will not apply to facilities regulated by the Industrial Section through the NPDES permit program, the pulp and paper industry is a significant treater of surface and ground waters and, therefore, has an interest in this general permit. Fort James' pulp and paper mill in Camas treats between 55 and 60 million gallons of water per day in the manufacture of paper products. We believe the analysis presented in the fact sheet and the limits being proposed may set a new standard for industrial facilities in the state once their NPDES permits come up for renewal. As such, we believe pulp and paper mills in particular should have been identified early on as stakeholders in this process.

RESPONSE:

Your interest in the process is noted. Although the initial request for stakeholders focused on drinking water facilities, an announcement was also put in the Ecology publication *Confluence* and on the Ecology web page. We regret that our efforts failed to identify you as a potential interested party.

COMMENT 8:

Comprehensiveness of BPT/BCT analysis. A significant body of documents was not reviewed by Ecology in reaching its decision regarding BPT/BCT. … in the mid-1980s, several pulp and paper mills challenged Ecology's best professional judgment (BPJ) analysis for the treatment of filter backwash. The Pollution Control Hearings Board records contained in Crown Zellerbach Corporation v. DOE (PCHB Nos. 85-223 and 85-242) discuss at great length the legal underpinnings of a BPJ analysis. We refer you to this PCHB decision (entered on July 15, 1986) and the supporting briefs.
We believe there would be an equitable way to address our concerns. We suggest you include a notation in the fact sheet and the response to comments stating that the BPJ analysis conducted by SAIC does not attempt to determine AKART for industrial water treatment systems and has not completed a review of relevant BPT/BCT factors contained in 40 CFR 125.3 as they might apply to non-municipal systems.

RESPONSE:

Ecology does not believe that the technology-based considerations associated with this general permit are flawed by a lack of review of documents. We believe that the BPT and BCT analysis of water treatment plants properly addressed the requirements of 40 CFR 125.3. The findings of PCHB Nos. 85-223 and 85-242 address two specific mills and conclude that Ecology did not adequately address the "unique site-specific conditions" of these mills in their case-by-case determination of technology-based effluent limits. The development of this general permit made assumptions that are appropriate for the water treatment industry as a whole. A facility that feels that their site-specific conditions would result in a different determination may request an individual permit. Water treatment works that are a part of a larger facility such as pulp and paper mills are covered by the NPDES permit issued to that facility and are not covered by this general permit (see response to comment 1). Site-specific considerations for these facilities are best addressed during issuance of their individual permit.